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Qualification Certificates:
Design works - Series AP № 000566 dated 30.05.12.
Examination and Appraisal of the Technical State of the Buildings and Structures - Series AE № 000447 dated 23.07.12.

Construction of the Complex for Agricultural Product Processing and Storage "Eastern" of FE "Organic Systems" within the territory of administrative area of Snigurivka Town Council, Snigurivka District, Mykolayiv region

WORK PROJECT

Volume 3

Environmental Impact Assessment
30.06.16/86 – EIA

Private Entrepreneur **R.N. Bila**

Chief Engineer **A.A. Goncharenko**

2016

/signature/

Official seal applied

No	Marking	Name	Note.
1	2	3	4
		Stage "Working Project "	
1	30.06.16/86 - ПЗ	Explanatory note	
2	30.06.16/86-ПОС	Construction organization project	
3	30.06.16/86-ОВОС	Assessment of impact on the environment	
5	30.06.16/86 -ГП	General layout	
	30.06.16/86-НВК	Outside water supply and sewage systems	
	30.06.16/86-НЭС	Outside electricity supply networks	
6	30.06.16/86 -ТХ	Technological solutions	
7	30.06.16/86 -АД	Road	
8	30.06.16/86 АПС. ГМ. АПТ, БЗ	Fire safety and technology related protection	
		Buildings and structures	
9	30.06.16/86 - 1	Administrative building (ТХ, АС, ОВ, ВК, ЭТР)	
10	30.06.16/86-2	Production building (АС, ОВ, ВК, ЭТР)	
11	30.06.16/86-3	Energy block (ТМ, АТМ, АС, ОВ, ВК, ЭТР)	
12	30.06.16/86-4	Vacuum evaporator (АС)	
13	30.06.16/86-5	Cooling towers of the VE (АС)	
14	30.06.16/86-6	Cooling towers of sterilizers (АС)	
15	30.06.16/86-7	Domestic waste water treatment facilities (АС, ВК, ЭТР)	
16	30.06.16/86-8	Water treatment site (ТХ, АС, ОВ, ВК, ЭТР)	
17	30.06.16/86-9	Tomatoes acceptance site (АС)	
18	30.06.16/86- 10	Pre-sale treatment of the finished product (ТХ, АС, ОВ, ВК, ТР)	
19	30.06.16/86 - 11, 1а	Weighting site with operator's room (АС, ЭТР)	
20	30.06.16/86- 13	Entry control laboratory (АС)	
21	30.06.16/86- 14	Control Point (АС, ОВ, ВК, ЭТР)	
22	30.06.16/86- 15	Transformer substation (АС, ОВ, ЭТР)	
23	30.06.16/86 - 17- 22	Circulating water treatment facilities (ТХ, АС, ОВ, ВК, ЭТР)	
24	30.06.16/86-23	Fueling point (ТХ, АС, ЗК, ЭТР)	
25	30.06.16/86-24	Finished product storage site (АС)	
26	30.06.16/86-25	Economic site (ТХ, АС, ОВ, ВК, ЭТР)	
27	30.06.16/86-4а	Apollo evaporator (АС)	

Guarantee of the Chief Engineer of the Project

The Project is developed in accordance with the applicable norms, rules ans standards

Guarantee of the Chief Engineer of the Project

A.A.

Goncharenko

Development

The working project was developmed by:

Part	Position	Name	Signature
Environmental impact ssessment	Chief Engineer of the project Private Entrepreneur Engineer	Goncharenko A.A. Certificate AP No.000565 Belaya R.N. Certificate AP No. 000566 Tkachenko V.Yu.	

1. Grounds for the Environmental Impact Assessment (EIA).

The ground for carrying out the EIA is the working project "The Domestic Complex for Agricultural Products Processing and Storage "Eastern" of the FE "Organic Systems" located within the territory of the Snigurivka Village Council, Snigurivna, Mykolayiv region."

The main types of impact of the facility on the environment are: impact on the air, ground and surface waters, soils and land.

During the EIA, the territory intended for the complex was examined, the design task and the technical conditions for the facility connection to engineering communications were studied. The calculations of the air pollutants emissions for the facility were made and the level of the facility's impact on the environment was determined.

The main types of impact on the environment of the facility operation are the following:

- impact on air made by pollutants emission (flue gases from a gas boiler, ventilation systems from the processing equipment, a breathing valve of a fuel tank, exhaust gases of vehicles);
- water environment water consumption and drainage (water treatment facilities);
- soil, solid domestic waste placement (SDW will be collected separately and transported to a specialized enterprises for processing and to the municipal landfill (materials that can not be recycled);
- social environment - increased payments to budgets of all levels, adding new jobs.

The impact made during the planned object construction:

- on air - exhaust gases from motor vehicles and mechanisms, electric welding emission (welding spray) and volatile solvents during painting, dust from ground works;
- on groundwater - pollution by construction waste and possible spills of oil products from construction machinery;
- on soils - by ground works, by the placement of construction waste;
- on flora – green plants preservation.

The EIA includes the following sanitary, ecological, firefighting and urban planning restrictions:

Ecological and sanitary and hygienic restrictions:

- for air pollution - the value of the maximum permissible concentrations (MPC) of pollutants in the air of settlements;
- for the soil, subsoil - the absence of intensive direct action on them;
- for surface and groundwater - water saving by means of the recycled water recirculation, no polluted sewage discharge; reduced fresh water consumption by means of the use of the evaporator's condensate and treated wastewater for irrigation; wastes recycling;
- sanitary norms - ensuring sanitary distances;
- flora - maximum plants planting and conservation of the existing green spaces.
- acoustic action - permissible noise levels.

Fire safety and urban planning restrictions:

- normativ

e distances beyween buildings and structures;

- site limits.

With the help of the mass media ("Snigurivshchina News" newspaper of 22.09.2016 – the Statement of Intent), the public was informed of the beginning of the complex construction, the location of it, the level of impact on the environment, the forms, place and time for the offers (as for the documentation) submission by individuals and legal entities. The public hearing was held on October 24, 2016 in Snigurivka. During the hearing local authorities and residents confirmed the positive impact of the planned activity on the social environment and their interest in the project implementation as soon as possible.

The following instructions and methodological literature were used for the development of this section of the EIA:

1. DBN A.2.2-1-2003 "Composition and content of materials for the environmental impact assessment (EIA) for the design and construction of enterprises, buildings and structures."
2. GOST 12.1.036 - 81. Noise. Permissible levels for houses and public buildings.
3 DBN 360-92 **. Urban planning. Planning and development of urban and rural settlements
4. Collection of emission indicators (specific emissions) of pollutants into the air by different industries. Volume I. Donetsk-2004.
5. Establishment of the permissible emissions of harmful substances into the atmosphere by enterprises of the Ministry of Transport of the UkrSSR. RD 238 USSR 84001-106-89. Ministry of Transport of the UkrSSR, K., in 1989.
6. The Law of Ukraine "On Environment Protection", "On Air Protection ", "On Land Protection", "On Wastes", "On Environmental Expertise", "On Information", "On the Basics of Urban Planning", the Land Code of Ukraine, the Water Code Ukraine.
7. DSTU 3013 - 95 "Hydrosphere - Rules for the control of the removal of rain and snow waters from the territory of cities and industrial enterprises".
8. Sanitary norms of permissible noise levels at workplaces., Moscow in 1985.

The design documentation is made for FE "ORGANIC SYSTEMS"
General designer – Private entrepreneur.

2. Physical and geographical and climate characteristics of the construction district and site.

2.1. Climate and micro climate.

The area for the complex location belongs to the II-nd climatic district (see DSTU - NB B. 1.1-27: 2010 "Construction climatology") with the following characteristics:

- the average maximum temperature of the hottest month $T^{Л}_{в}$= 30 °C;
- cold month $T^{ИЗ}_{в}$= - 26 °C;
- prevailing wind direction: south-east; the average annual wind speed is 29.7 m / sec;

The snow cover height: minimum - 5 cm; maximum - 34 cm.

The construction area is flat.

The houses are located at least 1200 m away from the nearest source of emission (normative - 100 m)

The complex has no negative impact on the climate. The climatic conditions do not worsen the dispersion of pollutants in the air.

The object construction will not affect the climate and microclimate changes because it implies no emission of inert gases, thermal emissions, moisture.

Meteorological characteristics and indexes determining the conditions for the dispersion of pollutants in the atmosphere of the location region are specified in Table 1.

Table 1

Meteorological characteristics and indexes determining the conditions for the dispersion of pollutants in the atmosphere.

Characteristic	Value
Coefficient depending on the atmosphere stratification, A	200
Coefficient of surface relief	1
Average temperature in the hottest month, HC	30
Average temperature outside in the cold season холодного периода, 1° C	-26
Average annual rose of winds, % N NE E SE S SW W NW Still	 21 13 15 8 14 8 9 12 8
Wind speed (based on average data for many years), repeatability above 5%, m/s	10

2.2 Geology

The engineering and geological processes at the studied site are: the flooding of the site with the waters of the Ingulets irrigation system and the loess soils with subsidence properties.

Geomorphologically, the site belongs to the watershed plateau of the Black Sea lowland. The surface of the site is flat with a common slope on the south-western side, behind the concrete channel on the eastern side.

The absolute surface marks differ from 57.4m in the eastern part of the site to 59.0m in the central and 58.3m in the western part of the site.

Quaternary eolian-deluvial deposits, in the form of loess loam and sandy loam, are covered in the geological structure of the site to the depth of 15.0 m, covered with soil and vegetation layer from the surface.

The engineering and geological conditions of the site studied are complex because of the presence of a series of subsidence grounds and flooding of the site with the waters of the Ingulets irrigation system.

The subsidence properties after the water saturation are characteristic for IGE 2,3 soils. The IGE-4,5,5a soils have self-compacted and partially lost subsidence properties due to the capillary rise from the aquifer formed as a result of flooding from the Ingulets irrigation system. This explains the minimum values of the relative subsidence under loading and the low deformation profile in a water saturated state. The IGE-6 soils do not have the subsidence characteristics.

The total subsidence of soil under its own weight if saturated with water, calculated by the wells No. 3,11 does not exceed 1 cm. The type of ground conditions by subsidence - one.

At the time of the evaluation, the groundwater was found in the southwestern part of the area concerned with wells No. 1, 2, 6 at the depth of 8.0 m, corresponding to the absolute mark 50.4 m. The waters have a

sparrow distribution and form the loess sandy loams of the IGE-5a. The wells No.7,10 have sandy loam with a plastic consistency. In the remaining wells, groundwater has not been met. The formation of the groundwater horizon occurs on IGE-6 loams, which are the regional water barrier. According to the results of the chemical analysis, the water contains C1 - 330-494, 304 790-1683 mg / l, NSOz > bmg-eq/l.

According to the data of the long-term observations of Snigurivskaya meliorative party, the groundwater level at the site was determined at the depths > 5 m (later confirmed by the results of the survey). In case of leaks from water-bearing communications during operation, it is possible to form an aquifer on the top of IGE-4 loam.

The corrosion activity of soils in relation to steel at the depths of 1-3 m is high. According to the results of the chemical analysis, groundwater contains GL 330-494, BOD 790-1683 mg / l; HNSO over 6 mg-eq / l.

The normative depth of soil freezing - 0.8 m. The normative seismic balance of the site - 5 points.

3. General characteristics of the facility designed.

The Complex for the Agricultural Products Processing and Storage "Eastern" of the FE "Organic Systems" will be located within the territory of Snigurivka village council of Snigurivka village, Mykolayiv region.

The planned field of activity – tomatoes processing, final product – tomato concentrated products.

The object includes: weighting and operator's rooms, entry control laboratory, tomatoes receiving bunkers, water treatment area, production building (with the chemical laboratory, agricultural laboratory, transformer substation, tare preparation site, warehouses for tare and chemicals, operator's room, room for eating and auxiliary facilities), technological equipment (washers, extractors, sterilizers, vacuum evaporator, Apollo evaporator aseptic fillers "COLD-BREAK "and "HOT-BREAK", pulping machines etc., sheds, cooling towers, gas distribution stations, distribution substations, gas boiler-house, compressor, production site, warehouse site for finished products, administrative building, fuel filling station, temporary parking lots, household waste water treatment installations "Biotal', sewage treatment plants and sewage treatment plants for recycled water supply. The latter include: a pumping station, rotary filters, plant wastes compacting press, hydrocyclone, sand removal screw, biological purification reactor, premises for reactor compressors, decanter, pumps for activated sludge, a polyelectrolyte preparation room, a chlorinator, a clean water accumulation pond.

General Layout speified in the Appendix 1. Technical and economical indexes for the objects

Index	Unit	Value
Site area	ha	12,0
Construction area	m^2	39748,6
Solid surface area	m^2	30215,0
Greenery area	m^2	50036,40
Raw material consumption (fresh tomato)	t/year	180000
Average product quantity (tomato paste)	t/year	27000
Natural gas consumption	mln.m /year	2,45
Water consumption for the pond filling	m^2	10000

УКРАЇНА МИКОЛАЇВСЬКА ОБЛАСТЬ ВІТОВСЬКИЙ РАЙОН с.ШЕВЧЕНКОВЕ ФЕРМЕРСЬКЕ ГОСПОДАРСТВО «ОРГАНІК СІСТЕМС» 35521091

Water consumption for operational needs	m^2/year	322605
Electricity consumption	mln. kWt. h/year	7,3
Number of main employees	Pers.	95
Number of seasonal employees	Pers.	200
Working period	Days/year (h/day)	60 (24)

Short characteristics of the production

Seasonal uninterrupted production, 3 shifts including the following stages:

1. Unloading. Tomatoes are delivered by road transport arriving to the weighting complex, if necessary vehicles wait at the parking and later they unload cargo with the help of hidromonitors to the channels of the acceptance bunker.

2. Washing. In the acceptance bunker takes place the primary separation of land and sand. Then, the tomatoes are transported to the first washing machine with the inclined transported, and to the second one with the hydrotransporter. The tomatoes are washed with rinsing water by means of turbulisation

3. Sorting. After washing, the tomatoes go electronic sorting machine to get rid of the black tomatoes and foreign substances. Then, they go to roller sorting line for inspection with manual separation of green tomatoes. The rejected tomatoes are used as fodder and before sending to the end users, they are stored within the complex on the special site with solid surface.

4. Juice extraction and evaporation to the state of tomato paste. Tomatoes pass to the pump-crusher, later they are fed to the heaters to inactivate enzymes, then they are transferred to pulping machines (extractors), the juice is pumped to the "Apollo" evaporator and the vacuum-evaporation unit (VEU).

5. Sterilization and packaging. Tomato paste is pumped from the VEU to the sterilizer, then it is packaged into 220 liters sterile bags in drums on a pallet by means of aseptic filler. Pallets with full drums are fed to the storage area and shipped to the consumer.

The sorting wastes are removed by hydrotransport, pulping wastes are removed by a screw conveyor and unloadede into vehicles.

The equipment is rinsed every 10 days, first with a solution of nitric acid, then with a solution of caustic soda (neutralizes acid), with the following adjustment to the desired water pH level. Reagents are removed from tanks by the pump from containers without harmful emissions. Neutralized water is sent to the circulating water supply.

Material balance of tomato paste production.

	Balance Part баланса	**Q-ty t/year**	**Realized t/year**	**Used t/year**
Receipts				
	Primary material	180000	-	-
	Total:	180000	-	-
Expenditures				
	Tomatoes rejected at sorting	3880	3880	-

	Production cake	6970	6970	-
	Sand residuals	290	-	290
	Juice evaporation condensate	141860	-	141860
	Finished product	27000	27000	-
	Total:	180000	37850	142150

Water supply, wastewater treatment and water disposal. Water supply for the primary filling of the storage pond and for the current needs is provided from the water supply system of the irrigation system. For industrial needs the water is used for transportation and washing of the raw materials, for washing and cooling of the equipment and for the production of steam in the boiler room for the chemical laboratory. The steam from the VEU condenses, the condensate is cooled at the cooling tower. It is partially used for feeding the cooling towers and the production turnover system, the rest of it is directed to irrigation of agricultural fields. Water is also used for domestic needs. The water consumption and wastewater balance is given in subsection 4.2.

Contaminated production waste water is fed through pre-treatment filters at a flow rate of 400 m3/h to waste water treatment facility of the circulation water supply system. It is treated with the following stages: filtration with removal of vegetable particles cake, sand separation, biological purification with excessive sludge removal, clarification with sludge recirculation and disinfection. After the completion of the seasonal cycle, treatment facilities are temporarily taken out of service.

An alternative to the wastewater treatment facilities is the wastewater discharge to the filtration field. It was rejected because of the need to allocate large areas of land and the hazard of groundwater pollution. Alternative options for handling the waste resulting from water treatment:

cake: 1) placing in a landfill; 2) usage for livestock feed;

sand: 1) placing in the landfill; 2) transportation to agricultural fields;

sediment of excessive sludge: 1) placing in a landfill; 2) usage as a fertilizer for agricultural crops with or without composting (at a similar "CLABER ECOLOGIA" plant in Italy, the sediment is stored in a compost pit within its own territory).

Options No. 2 have been adopted for economic reasons. In addition to production circulation, there are water circulation systems for cooling towers and pools used for sterilizers and for VEU cooling.

In addition to production circulation, there are water circulation systems for cooling towers and pools used for sterilizers and for VEU cooling.

In addition to the production sewage system, there is a household one made of plastic pipes and designed for the household premises of the production building, boiler room, chemical laboratory, administrative building and rainwater. The automated closed installation "Biotal-20" with a productivity of 20 m / day with a casing made of polypropylene and a storage container is used for cleaning and disinfection of domestic sewage. It operates at full load 60 days / year and during the off-season with the light load, to ensure the needs of the complex. The storm drain from the territory is performed to the treatment facilities to the conditionally clean wastewater accumulation facility (600 m3). Water is pumped from the accumulation pond to water the greenery.

The steam is consumed by heaters, evaporators, sterilizers, aseptic filler. The steam supply is provided from the boiler room with 2 BOSH boilers (pressure - 16 bar, condensate return - 95%, steam temperature - 204 ° C). The boiler room is chemically cleaned with water from the Grunbeck installation, the conditionally clean wastewater from is supplied to the system of industrial water circulation. The circulation system of the boiler

house has 60.0 m3/h of water circulation. The boilers are equipped with blowers and burners, ensuring the complete combustion of fuel with minimal formation of harmful substances, they are automated and have a water economizer (heat exchanger giving off the heat of flue gases to the incoming water). The sound pressure level of the burners with no noise protection makes 85 dBA. The combustion products are separated from the boilers through an individual chimney (d = 1.0 m, h-23.33m). In the process of fuel combustion, the harmful substances are formed: nitrogen dioxide, carbon oxide, nitric oxide, mercury and methane, (the calculations are specified in Annex 4).

Storage of bags and chemical agents

There is the premise used for storage of sterile polyethylene bags (up to 176423 pcs/year of 2 types in cardboard boxes) and stretch films (up to 28.6 tons / year); warehouse for chemical reagents under a shed near the engineering building for storing of up to 1.5 tons of 58% nitric acid solution in 54 plastic canisters (20 liters each) and up to 130 tons of 44% caustic soda solution in 89 plastic containers (1 m each). Packaging of chemical reagents in the warehouse is not performed, there is no emission of harmful substances. Polyethylene bags and stretch films, cardboard packaging, wooden pallets are combustible; nitric acid (NO_3).

The strong acid and oxidizer causing the corrosion of metals and concrete, skin burns, respiratory tract and eyes, are neutralized by a 5% solution of soda Na_2CO_3; caustic soda (NaOH) - corrodes glass and metals, causes skin burns, the spills are neutralized with 3% acetic acid solution. They are not classified as flammable or explosive.

Auxiliary Services

Chemical laboratory ensures the laboratory maintenance of production. It produces the distillate, performs chemical plates washing and chemical analyses with the use of nitric, hydrochloric and sulfuric acids for 2 hours once in 2 days, it operates 60 hours/year totally. Before the acids drainage, they are neutralized with the solution of soda in a separate container. The premises are equipped with the forced ventilation.

The repairs, except for those small and those not requiring special equipment are performed by the third-party enterprises.

The fueling station (FS) is supposed to be used in the form of a modular container. The purpose of container type FS is the non-commercial supply of diesel fuel (DF) to company's vehicles. The technological system of the container-type fueling station includes above-ground reservoir for DF storage with a volume of 8 m3 and the fuel dispenser (FD) with a pump with a check valve inside the container.

There is a spillway collection tray in the technological compartment, under the fuel dispenser with a pump. The filling of the fuel tank is done forcibly – with the help of the vehicle fueller's pump. To prevent accidental overfilling of fuel during the filling process, it is equipped with an upper level sensor.

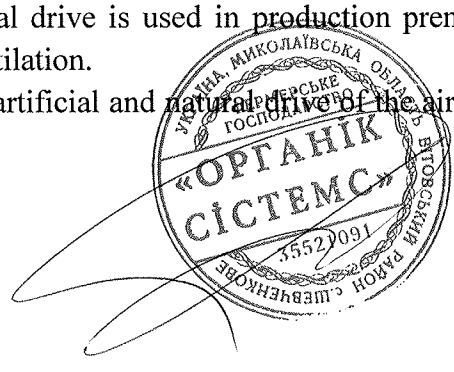
The monolithic reinforced concrete site with a contour lining, channel and pit are used to organize the collection of spills and storm sewage.

The fuel tank breathing valve (diesel fuel) and fuel dispenser cranes are the sources of pollutant emissions at the fuel dispenser point. The ultimate hydrocarbons are the pollutants.

The engines at the time of their heating, driving and maneuvering are the source of pollutants emissions from vehicles in the territory of the facility, parking (for cars and trucks) while entering, leaving and maneuvering within the territory of the company. Nitrogen dioxide, carbon oxide and hydrocarbons are the pollutants.

The intake and exhaust ventilation with natural and mechanical drive is used in production premises. The premises containing dispensers are equipped with emergency ventilation.

The premises are equipped with forced-air ventilation with the artificial and natural drive of the air, designed to remove heat, moisture, and hazards.



The agricultural laboratory and chemical laboratory have general exchange ventilation with a supply and exhaust system with heat recovery. To compensate the exhaust from the exhaust cabinet SHUV-1, there is a supply installation, which is activated during the exhaust cabinet operation. On the ground of OND-86, clauses 2.3, 5.21 and 7.8, the pollutants dispersion in the hot shop according to the "EOL +" (version 5.23) was not calculated as due to inadvisibility (calculations are specified in Appendix 4)

The water resources impact assessment is necessary because of the water consumption and water drainage. The quantity of the water used, the efficiency of the water treatment facilities in securing not polluted discharge, the impact of temporary suspension of operation of the water treatment facilities, after the end of the seasonal cycle, the quantity and impact of wastes from all the treatment facilities, the possibility of filtration leaks, impact of the treated waste water and storm water.

The impact during construction is specified in part 9.

The calculated water consumption is 16328,5 m^3 / day; 1469565 m^3 / year, incl.

- from the system of the united economic-drinking and industrial water supply: 3584,5 m3/day; 322605,0 m3/year;
- from the circulating water supply system of treated industrial waste water (industrial sewerage): 12744 m3 / day; 1146960 m3 / year.

Estimated water discharge: 2744 m3 / day; 1146960 m3 / year, incl.

- to industrial sewerage (after cleaning it is used for washing of the raw materials - water circulation system): 12744 m / day; 1146960m3 / year.
- Irretrievable losses: 3584.5 m3 / day; 322605,0 m3 / year.

The treated wastewater is collected in a storage tank and used to irrigate greenery, if necessary.

The object construction includes the following works: earthwork (removal of the fertile soil layer, transportation of it to the storage site and neighboring farmlands, bulldozer planning, trenches and pits making to the depth of up to 3m (with the help of excavator), concrete, insulation, welding, painting, installation (structures and equipment with a high degree of factory readiness are delivered by road; the unloading and installation are performed with the help of a truck crane). The personnel of the construction organization uses a biotoilet and a garbage container. The factors of negative impact on the environment during construction: removal of the fertile soil layer, soil treatment, noise and pollutants emissions into the atmosphere, wastes. The ecological state of the environment will quickly return to the original after the construction completion. The influence area of air pollution does not go beyond the territory of the facility.

The emergency emission goes beyond the territory of the object.

The quantitative and qualitative characteristics of the pollutant emissions were determined with the help of calculation method in accordance with the methods (6-7), on the ground of data on expenditure of raw materials and materials, the operating mode of the process equipment (calculations are specified in Appendix 4).

The list of technological equipment, emitting pollutants, emission diameters and heights from the facility, the volume of the gas-air mixture, the gas-air mixture speed at the outlet and the temperature of the mixture are specified in Appendix 3.

3.1 The grounding of the object location principle. Alternative variants research.

The alternative variants for the location of the activities planned have not been considered, because it is performed on the company's own land plot. The advantages taken into account for the location: the resource base proximity, the potential source of water availability (Ingulets irrigation system), roads and local labor. The alternative of giving up the activity was not accepted because of potential economic benefits. The selected site for the placement of the object met the requirements of the building guidelines and regulations.

4. The Assessment of the Planed Activities Impact on the Environment.

4.1 The Assessment of the Impact on Air.

The main sources of air pollution during the facility operation:

- gas boiler (chimney) - pollutants: nitrogen oxides, carbon oxide, mercury and methane.
- fueling station (respiratory valve of the tank) - pollutants: hydrocarbons;
- fuel-dispenser (dispensing crane) - pollutants: hydrocarbons;
- gas distribution point (safety valve) - pollutants: methane;
- road transport (exhaust pipes) - pollutants: nitrogen dioxide, carbon oxide, hydrocarbons.

The calculation in "EOL+" software was made to determine the contamination of the surface layer by the emissions of pollutants from the object's sources, taking into account the meteorological characteristics, determining the dispersion conditions.

The calculation was performed for nitrogen oxide, nitrogen dioxide, carbon oxide, mercury, methane and hydrocarbons. The background concentrations for the object design area were used for the calculations.

According to the calculation data (the method of defining the background concentrations values, dated July 30, 2001), the level of contamination of the atmosphere surface layer in that area is characterized with the background concentrations:

- 0.008 mg / m^3 (0.04 threshold level value);
- 0.4 mg / m^3 (0.08 threshold level value).

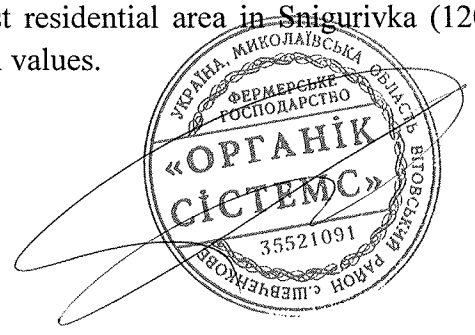
The results of calculation of the surface concentrations are specified in table 2.

The analyses of the results of calculations demonstrated that the maximum concentrations of pollutants in the surface layer of the atmosphere, created by the emission sources (considering the background concentrations) make:

- mercury - 0,0014 threshold level value;
- nitrogen dioxide - 0, 56 threshold level value;
- nitrogen oxide - 0,00084 threshold level value;
- carbon oxide - 0,59 threshold level value;
-hydrocarbons- 0,67 threshold level value;
- methane -0,017 threshold level value.

When the complex operates in the main mode, the maximum concentrations of the pollutants within the territory and on the border of the normative sanitary protective zone do not exceed the threshold level value. The boiler room makes the main contribution to air pollution. The impact on the air does not exceed the normative values and is temporary (2 months per year).

The concentrations of all pollutants at the border of the nearest residential area in Snigurivka (1200m) during the object operation period do not exceed the threshold level values.

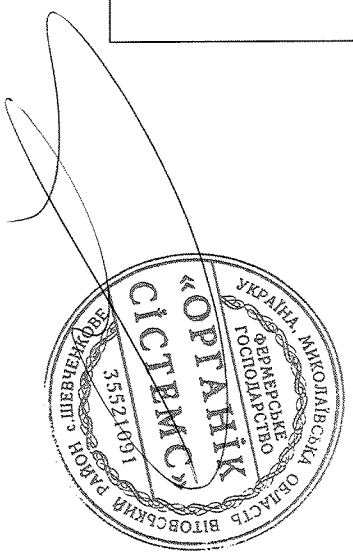


These concentrations demonstrate that emissions of pollutants into the atmosphere, taking into account the background concentrations, are within the limits of sanitary standards; they are permissible and will not have an irreversible effect on the air in the area where the object is located.

Calculation Results for Surface Concentrations.

Table 2

Emission source	Наименование загрязняющего вещества	Pollutants emission for the company (total)				Max surface concentration at the borders of residential area	
		Approved by the main municipal organization values		Emissions according to project solutions		Company contribution (incl. background)	Background
		g/sec	t/year	g/sec	t/year	Share of threshold value	Share of threshold value
Processing and storage complex	Nitrogen dioxide	-	-	1,303	2,47	0,56	0,04
	Mercury	-	-	0,0000015	0,00001	0,0014	-
	Nitrogen oxide	-	-	0,0015	0,008	0,00084	-
	Carbon oxide	-	-	4,26	7,263	0,59	0,08
	Methane	-	-	0,14	0,75	0,017	-
	Hydrocarbons	-	-	0,61	0,051	0,67	-



The additional special measures to reduce emissions are not planned, because the contribution of object's emission sources to the air pollution is insignificant and does not excess the threshold level value. Due to the low impact of the emissions, the unfavorable meteorological conditions do not require any changes in the operating mode of the object.

The comparative table of the pollutants emissions to the atmosphere according to the Decree of the Ministry of Natural Resources of Ukraine dated 28.06.2006 No. 309

Hazard lass	Substance	Normative indexes	Indexes for calculations
		Threshold values for emissions, mg/m^3	Actual Emission mg/m^3
Class I	Mercury and compounds	0,2 mg/m^3	0,05
Class IV	Nitrogen dioxide	500 mg/m^3	277
Class IV	Nitrogen oxide	500 mg/m^3	0,32
Class IV	Carbon oxide	250 mg/m^3	185

Values of pollutants are within the normative tolerance.

The initial computer documentation is attached in Appendix 6.

The map-scheme with application of the air pollutants emissions sources is attached in Appendix 2.

The economic damage caused by the pollutants emission into the atmosphere from the object's sources is defined in accordance with the Tax Code of Ukraine dated 08.04.2014 No. 1191-UN "Procedure for establishing the standards for the pollution fee and the fee collection" according to the formula:

$П_{вс} = \sum_{i=1} (M_i \times Hn_i)$ hrn., where,

Hn_i – basic normative, hrn/t;

M_i – pollutant emission, t/year.

The calculation of the economic damage for the object is specified in the table (see Table 3)

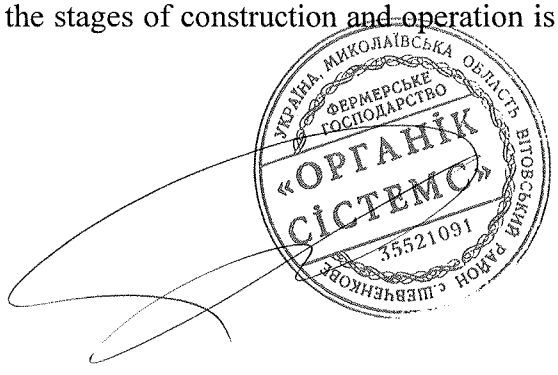
Table 3

Substance	Hazard class	Emission, t/year	Payment normative, hrn/t	Payment, hrn.
1	2	3	4	5
Construction Stage				
	IV	1,72	87,81	36,88
Xylol	III	2,73	379,22	299,6
Ferric oxide	III	0,071	379,22	26,92
Manganese and compounds	II	0,005	12298,01	61,49
Chromium oxide	I	0,0002	41713,2	8,34
Carbon oxide	IV	14,78	58,54	865,2
Nitrogen dioxide	II	1,4	1553,79	2175,3
Hydrocarbons	IV	0,33	87,81	28,97
Powder n/o SiO_2 70-20%	III	0,3	379,22	113,7
Vinegar acid	III	0,0003	379,22	0,11
Polypropylene powder	IV	0,0001	87,81	0,009
Subtotal:				3616,5
Operation Stage				
Carbon oxide	IV	7,26	58,54	422,8
Nitrogen dioxide	11	2,47	1553,79	3837,9
Hydrocarbons	IV	0,051	87,81	4,48
Mercury	I	0,00001	65683,81	0,66
Nitrogen oxide	III	0,008	1553,79	12,43
Methane	IV	0,75	87,81	65,85
Subtotal:				4344,12
Total:				7960,6

The economic damage from the placement of wastes at the stages of construction and operation is defined on the ground of the formula:

$П_{вс} = \sum_{i=1} (M_i \times Hn_i \times k_t \times k_0)$ hrn, where,

Hn_i – basic normative, hrn/t;



M_i – pollutant emission, t/year.
κ_T – index, depending on the place (area) for the placement of wastes in the natural environment (3,0);
κ_0 - index, depending on the place for the placement of wastes (1,0).

The calculation of the economic damage for the object is represented in the table form (see Table 4)

Table 4

Substance	Hazard class	M_i t/hour	H_{ni} Hrn/t	κ_T	κ_0	Payment
Construction stage						
Construction wastes:						
Electrodes	IV	0,014	3,17	3	1	0,13
Painting material tare	IV	0,1	3,17	3	1	0,95
Metal structures	IV	0,5	3,17	3	1	4,8
Rags	IV	0,2	3,17	3	1	1,9
Solid domestic wastes	IV	70,0	3,17	3	1	665,7
Щебснь	IV	9,6	3,17	3	1	91,3
Sand	IV	6,0	3,17	3	1	57,1
Mixture of soil and stone	IV	15,0	3,17	3	1	143,65
Subtotal:						965,33
Operation stage						
Domestic wastes: domestic ıbbish	IV	140	3,17	3,0	1,0	1331,4
Luminescent lamps, pcs.	I	(80)	(822,5)	3,0	1,0	197400
						197531,4
Total:						198496,3

4.2 Assessment of the impact of emergencies on the environment

The following emergency situations are possible at the object: 1) gas explosion in the result of the violation of the safety rules; 2) fire in the result of the violation of fire safety rules; 3) waste water treatment facilities shutdown in the result of the equipment malfunction. The explosion will be limited to the boiler room. Fire will not be developed because of the fire breaks. In case of the waste water treatment facility stop, the input and cleaning will be stopped at the same time.

The measures taken to ensure the safe work of the service personnel helped to prevent the possibility of emergency situation and lead to relatively low possibility of such situations.

Measures on the prevention of accidents, containment of the leaks of hazardous substances, fire and explosion safety:

Boilers are equipped with safety and regulating devices;

Reliable water supply for fire extinguishing systems, internal fire extinguishing system at boiler room, anti-explosion safety valve placed at the top of gas duct of the boiler to prevent exposure of personnel when activated;

Easily blowing out glazing in the boiler room to ease explosion pressure and vent out smoke; venting of gas ducts;

Corrosion-resistant materials for the equipment and ducts (stainless steel, aluminum, polypropylene);

Hydro-insulation of underground parts of the bio-reactor and decanter of the water treatment and recycling facility, annual cleansing and inspection of the bio-reactor;

Redundant pumps for water-lifting station, disinfection, silt recirculation at the water treatment and recycling facility

Stoppage of tomatoes intake and washing when the water treatment and recycling facility stopped.

Fire-resistant treatment of supporting structures of buildings and ventilation systems, if required;

- fire-resistant couplers at the crossings of firewalls by electric cables and piping
- provision of fire-gaps
- fire-pond, other fire and emergency provisions in the project;
- Fire-engine access driveways;
- Provision of primary fire-extinguishing tools
- Lightning-protection, protective grounding, safety-switching of electric power

4.3 Noise Exposure

Technological and ventilation equipment is the source of noise

Furnaces of boilers are equipped with noise protections, diesel generator has muffler and vibration-dumping gaskets. Ventilation fans are installed on vibration-dumping foundations; Fans are coupled to ducts with flexible couplers.

Considering this and the distance to nearest houses of 1200 m from the complex perimeter (sanitary regulations requirement is 100 m), estimation of noise exposure of residential areas is unnecessary.

Noise from the technological equipment is within regulation requirements due to modern, state of the art equipment having low noise footprint.

Noise level at the workplaces is below required 80 dB (as per sanitary norm requirement SN 3223-85)

4.4 Estimation of the impact on soil

Measures to implement during construction works:

- To remove 42239m^3 of fertile soil (under the plant) of which to relocate 1823m^3 (h=0.15m, S=12154 m^2) for landscaping. The rest of removed soil to be stored at piles on the area belonging to the complex
- To remove 4408 m^3 of fertile soil (under the parking lot) of which to relocate 217.5 m3 (h=0.15m, S=1450m^2) for landscaping. The rest of removed soil to be stored in piles on the area at 250 m distance, belonging to the complex

While operating, impact of the complex on soil is minimized by hard pavement of the area.

Hazardous waste: luminescent lamps (80 pcs per year) to be stored in separate metal containers and periodically transferred for recycling, without impact on soil and ground. Environmental damage estimated from lamps quantity is 197400 UAH per year.

Considering provisions of temporary storage of waste inside the area in specially allocated places, hard pavement of the area, drainage system with local decontamination system for oil-contaminated drainage, impact of the object on soils is insignificant

Measures on prevention and minimization of negative impact on soil and ground (recycling of mercury-containing lamps, dehydration of waste, usage of sorting rejects and cake as livestock fodder, disposal of sand and slit to the cultivated fields, disposal of solid waste and solid fraction of drainage filtering to the landfill) are well substantiated economically and environmentally.

Subsection summary

No direct negative impact on soil and ground while operating. Acting regulations and requirements are observed. Disposal of sand and slit to cultivated fields has positive impact on soil. Indirect impact of solid waste disposal to the landfill is insignificant.

4.4. Impact on plants and animals

No tree cutting is required. There are no existing plantation on the construction site.

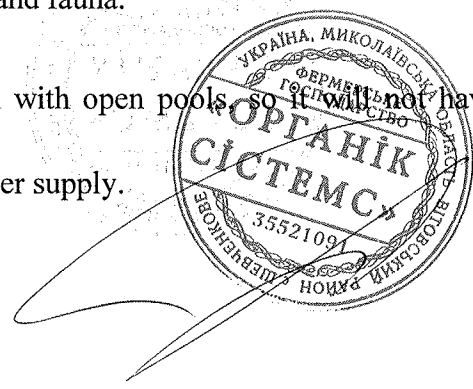
Driveways, entrances, sidewalks to be paved with concrete.

To ensure optimal sanitary conditions, landscaping measures are planned for the complex area (area of lawns S=13604 m^2, trees and bushes to be planted at the plant area, lawns with perennial grasses near parking lots area). Object has no negative impact on natural flora and fauna.

4.6 The Assessment of the Impact on Water Environment.

The territory of the object will not have the direct connection with open pools, so it will not have any impact on them.

The artesian well is the source of the economic and drinking water supply.



The need to assess the impacts is caused by water consumption and wastewater disposal of the object. The following is subject to the assessment: the amount of water used, the effect of water intake, the capacity of treatment facilities to ensure that there is no contaminated effect of the temporary withdrawal of water treatment facilities from the end of the seasonal cycle, the amount and impact of the wastes from all the buildings, the possibility of filtration leaks, the impact of the treated domestic waste water and storm water. The assessment of impact during construction is specified in part 9.

The calculated water consumption makes 16328,5 m3/day; 1469565 m3/year, including:

- from the system of the general economic-drinking and industrial water piping: 3584,5 m^3/day; 322605,0 m^3/year;

-from the system of circular water supply of the treated industrial waste water (industrial sewage water) 12744 m^3/day; 1146960 m^3/year.

Calculated water disposal: 2744 m^3/day; 1146960 m^3/year, including

-to the industrial sewage water (after treatment is used for raw materials washing – water circulation система оборота воды): 12744 m^3/day.; 1146960 m^3/year.

- irrecoverable losses: 3584,5 m^3/day; 322605,0 m^3/year.

General indicators for the water system and waste water

System	Расчётные расходы			Note
	м /сут	м /час	л/сек	
1. Water piping	3600,0	150,0	41,7	
Economic-drinking including - for domestic needs; - for industrial needs	 15,5 3584,5*	4,3 145,7	2,14 2,46	Including hot water supply
2. Hot water supply	7,41	2,53	1,68	Central hot water supply from boiler room.
3. Domestic sewage water	15,5	4,3	3,74	After clenasing sent to the accumulation tank
4. Industrial sewage water	12744**	531,0	147,5	After cleansing sent to the circulation system of the treated industrial waste water.
5. Irreversible losses	3600	150.0	41,7	
6. Storm sewage system	782.6	156.5	43.5	

2880,0 - replenishment of the circulating water supply system of the treated industrial wastewater; 348 - boiler and heating network replenishment;

356.5 – replenishment of the cooling system for vacuum evaporation part and sterilization site cooling system.

** - after treatment, it is sent to the unloading and washing site of the raw material (the system of circulation water supply of industrial wastewater).

In the further design, there will be considered the possibility to use water from artesian wells designed separately.

Assesment of the effeciency of treatment of the industrial circulation water

Technological process of treatment:

1. Pre-treatment on the filters at the production output.

2. Filtration on rotary filters for the removal from the water of plant particles (peel, seed, grass) with pressing by means of a screw press.

3. Separation of sand by means of hydrocyclone, where sand is pushed to the side walls, then the sand falls into a hopper at the bottom and is sent to a static decanter. Its bottom auger dehydrates the sand to 50% moisture. The sand is unloaded into a container, the water is returned to the lifting station.

4. Biological purification from organics (sugar, acids) by aerobic bacteria of active sludge in the 2-stage oxidation reactor with a volume of 4,600 m^3 with a system for recirculating and removal of the excessive sludge. If the oxygen content is lowered, compressors (blowers) are switched on to saturate the water with oxygen from the bottom diffusers. The excessive sludge is the result of swelling upon absorption of organic matter, it is extracted from the recirculation system and pumped to dehydration.

5. Clarification in a decanter (volume - 4600 m) with settled sludge collection with scraper bridge into the central bunker, from where it is pumped back to the bio-cleaning reactor. The cleared water is poured around the perimeter into the production capacity measurement channel to ensure the chlorination accuracy.

6. Water disinfection with adding of sodium hypochlorite solution by dosing pumps from a container (1m capacity). Sodium hypochlorite contains 95.2% of active chlorine, which is completely spent for disinfection.

7. Dehydration of excessive sludge with the concentration of 2-3% to 25-30% in centrifuge, with introduction of a polyelectrolyte solution for the sludge coagulation. It is prepared in mixer using an automatic feeder. The sludge is transferred into the container and water goes back to the lifting station.

Technical solutions efficiency assessment

The filtration of contaminated water and the compaction of plant wastes, to be fed to livestock, as effectively used on analogues. The method of separating sand by means of hydrocyclone is efficient, it is used at the analogues; a similar method of sand removal in arc-shaped channels is used in water treatment facilities of the British company United Utilities. The separated sand at the analogues is transferred to the fields. Biological purification is a common method, used at the analogues with variations. The adopted 2-stage treatment is an improvement, because 2 reactors operating on two different concentrations of active sludge increase the purification rate for the same volume of the reactor, as confirmed by the use at the analogues.

Water clarification by means of decantation with recirculation of sludge is a common practice with the same hardware at the analogues. Water disinfection by means of chlorination is the generally accepted and most reliable method for disinfection, which is compulsory to be used for washing of food raw materials. Dehydration of the sludge by centrifugation with polyelectrolyte is a highly efficient solution for subsequent transportation, so as it allows to reduce the volume of wastes (8-9 times). The return of the fugate to water circulation is a water saving measure and excludes drains.

Conclusions. The technical solutions used are at the highest level of modern technical solutions (in comparison with Ukrainian and foreign analogues).

The assessment of the circulating water treatment efficiency Characteristics of the waste waters at the analogues with the flow rate 400 m^3/hour:

№	Indicator	Concentration, mg/l (mg-eq/l)		
		Before treatment [13-1]	After treatment	
			Data of GLABER ECOLOGIA	Data of the objects-analogues
1	BOD	382	below 25	-
2	COD	763	below 75	40,0
3	Weighted materials	370	below 30	-
4	General hardness	-	-	4,5
5	General ferrum	-	-	0,3
6	Chlorides	-	-	75,0
7	Nitrates	-	-	20,5

This way the water treatment facilities allow the usage of water in circulation without drain.

The assesment of impact of the suspension of the water treatment facilities operation.

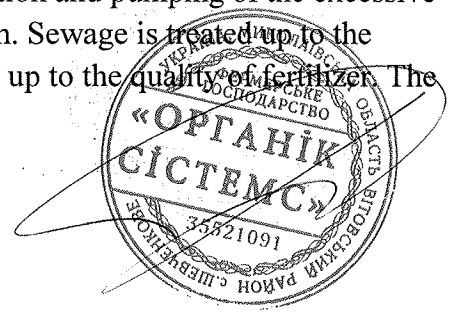
After the end of a seasonal cycle (once a year), the water treatment facilities are temporarily taken out of service. Water from the bioreactor is pumped to the decanter and the bioreactor is inspected. After the water is transferred from the decanter, the sludge from the central bunker is transferred to the centrifuge, later 335 tons of sludge are discharged into the container and taken out; the water remaining in the decanter is kept there to prevent freezing of the loaded equipment. Thus, there is no negative impact on the environment.

Assesment of the possibility and impact of the filtration leaks

Filtration leaks from communications and treatment facilities are prevented by means of usage of the equipment and pipelines from non-corrosive materials (stainless steel, aluminum, polypropylene), reliable waterproofing of concrete structures of bioreactor and decanter, tight connections of pipes for the underground communications. The casing of the Biotal unit is made of polypropylene, which is chemically inactive, it does not corrode, does not allow moisture, virtually eliminating the possibility of leaks. Therefore, leaks are not forecasted, so they will have no impact on the groundwater, that is proved by the operation of objects-analogues.

Assesment of the efficiency of treatment of domestic waste water

Domestic wastewater is sent to the Biotal-20 unit, the operation of which is based on the aeration of effluents with activated sludge microorganisms, where they are cleaned in the following sequence: 1) catching the coarse mechanical contaminants, bubbling and biological pre-cleaning in the accepting tank - BV11-1 reactor; 2) biological purification in the BVD-P reactor; 3) complete biological purification in the BVD-Sh reactor with automatic regulation of the active sludge concentration and pumping of the excessive quantity to the sludge chamber; 4) tertiary sedimentation with disinfection. Sewage is treated up to the quality of technical water, suitable for irrigation, and the sludge is treated up to the quality of fertilizer. The characteristics of waste water are given according to the developer:



No.	Indicator	Concentration, mg/l		
		Before treatment	After treatment	Theshold valur
1	BOD	287	2,38	3,0
2	COD	431	28,4	30
3	Weighted materials	260	2,96	0,25 to background
4	Vegetable fats	50		
5	Detergent	10	0,73	0,5
6	Solid residual	2017	400-450	1000
7	Ammonium nitrogen	32	0,9	2,0
8	Chlorides	350	51	350
9	Phosphates	21,4	2,3	3,5
10	Oil products	2,8	-	0,3
11	Sulphates	190	43,4	500

Thus, the treated domestic sewage water after the Biotal-20 meet the sanitary and hygienic standards and can be used for the watering of greenery in the territory of the complex designed.

The capacity of the unit makes 20 m^3/ day ensures the cleaning of the domestic sewage system at the complex. VYUTA installation is manufactured by LLC "UKRBIOTAL" in Rivne under TU B 900307 166 13. 001-2001. All the equipment, materials and components used in the installation meet the requirements of the applicable sanitary legislation of Ukraine and they are safe for human health as confirmed in the conclusion of the State Sanitary and Hygienic Expertise No. 5.10 / 586 dated 10.01.2002. The Biotal installation is operated at the object-analog in Gola Prystan. The items, accidentally trapped (for example, hygienic) and the sand sediment from the receiving tank are transported to the municipal water treatment facilities. The uninterrupted operation of the Biotal installation is guaranteed by the backup power supply (diesel generator). The service life of the installation's housing makes at least 20 years. After that period, it is necessary to carry out an inspection of the housing including pumping water out from it; if there are no cracks and weak points, operation can be continued. If defects are detected, the housing is taken from the ground, cut into pieces by a manual circular electric saw and sent for the processing to a specialized company where the polymer is crushed and processed by injection molding into non-critical products. Instead of recycling, it is possible to completely restore the housing with an inner lining with new sheets of polypropylene by means of welding them with melting. Thus, there is no negative effects at the periods when the activities of the installation are suspended.

The assessment of the impact of storm sewage.

The contamination of the storm water stock is possible with the oil products, sand and land from the road vehicles. With the aim of the effective cleaning, the storm water collector is made on the separate treatment facilities. The territory will not be contaminated by the storm water collector by the warehouse storage sites (pallats, empty or closed drums), Biotal installation, technological equipment (closed) and circulation water treatment facilities, that is confirmed by means of the inspection of the objects in Gola Pristan and Shevchenko. The accidental spills of wastes (cake, sand and silt) are possible at the waste water treatment

plants, but their impact is insignificant, so as all the waste products are not hazardous, they are easily cleaned (thanks to the hard covering on the territory). A large number of spills is not expected, and there is no direct communication of the storm water collector with any water objects.

Appraisal of the efficiency of the storm water collector treatment facilities.

Three-stage wastewater treatment is provided: 1-st stage - primary settling unit for rough cleaning from solid particles and oil products, 2-nd stage- secondary settling unit for additional cleaning, 3rd stage - purification on filter with granulated peat sorbent ТУ У 13850088.001-94 manufactured by ENT company in Mykolayiv. The project implies the purification of the most contaminated part of the runoff (the first portions of rain).

The calculation of the amount of pollutants M was performed with the method, taking into account the working period of the object making T = 60 days / year. The calculation is specified in the table:

Substance	Washing normative, Gi/ga per year	P poll ha	Mt/season Mi =GxFxT/365
Weighted substances (WS)	7,8246	6,2	7,9
Oil products (OP)	0,1575		0,16

The concentration of the pollutants there is defined following the formula:

Ci кон = $M_{кон}$: V* 10^6, г/$м^3$

- Свв = 0,077:5260*10^{6}= 14,6 г/$м^3$ – below the background in the water ponds of Mykolayiv region.
- Снп = 0,0001:5260*10^6 - 0,02 г/$м^3$ – below threshold concentration value fish.-econ. - 0,05 g/m^3 and threshold concentration value san.-hyg. for the cultural usage water ponds - 0,3 g/m^3.

The concentrations of pollutants in storm water collector after treatment facilities meet the level necessary to discharge them into an open basin, but it is sent to accumulation reservoir for conditionally clean sewage water and later pumped to be used for greenery watering. The oil products, sediment and used sorbent are removed from the treatment facilities and transported to other places. The impact on the environment of storm water from the territory of the complex is insignificant.

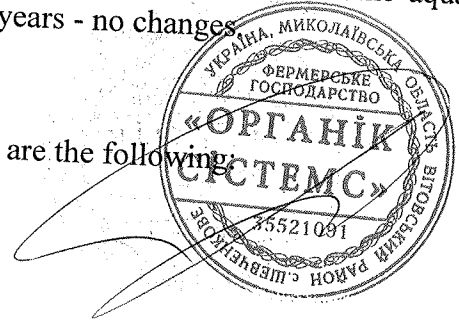
Measures to prevent introduction to the aquatic environment of some hazardous substances, depletion of water resources, deterioration of water conditions and degradation of water organisms (saving water resources by a closed cycle of water supply from the manufacturing without discharge; the usage of corrosion-resistant materials; structures waterproofing, wastes collection and removal, domestic sewage and rain water treatment facilities) are economically and environmentally grounded.

General assesment for the subsection

The impacts on water bodies during operation take place only by means of the acceptable water intake; there is no waste water discharge to water bodies, so the planned activity can be characterized as water protective. The established restrictions are sustained. The forecast of changes of the state of the aquatic environment, with or without the planned activity for the period of 20 years - no changes.

4.7 **Assesment of the impact of manufacture wastes.**

The main wastes produced during the normal operation of the facility are the following:



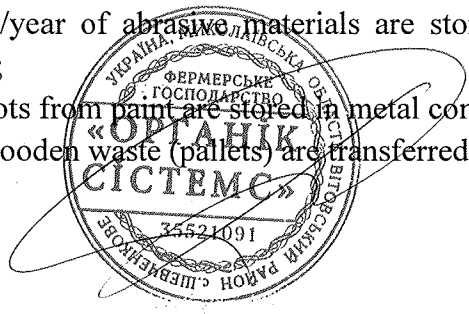
Gaseous pollutants emission into the atmosphere - greenhouse gases (carbon dioxide and nitrogen dioxide) - 4790 tons / year;

Liquid:

- 455.7 m^3/year of the treated domestic wastewater and the treated storm water are used to greenery watering in the territory of the complex.
- 0,16 t/year of oil products from the storm water treatment are transferred for recycling.

Solid:

- 4680 t/year of wastes from tomatoes sorting and 8400 t/year of cake - are transferred to be used as livestock fodder.
- 360 t/year of sand from treatment facilities are transferred to agricultural fields;
- 4535 t/year of a wet sludge deposits from waste water treatment facilities are transferred to company's own farming fields as a fertilizer;
- 1,0 m^3/year of sludge deposits from the Biotal unit is transported to company's own farming fields as a fertilizer or to the municipal wastewater treatment facilities, the objects and sand deposits from the acceptance tank (0.05 t/year) are transported there too;
- 79 t/hour of the sludge from the storm water treatment and 0.01 t/year of the used sorbent are transferred to the landfill;
- 10 t/year of waste paper and 11 tons / year of polyethylene film are transferred for recycling;
- 0,8 t/year of waste batteries are stored in metal containers and transported under the customer's contract;
- 172 pcs/year of tare for chemical reagents - returned to the supplier for reuse;
- 1,5 kg/year of laboratory chemistry (chemicals) are stored in metal containers and transported under the customer's contract;
- 5 t/year of black scrap metal and 0.4 t of color scrap metal are stored at the warehouse with a shed and transferred under the customer's contract;
- 0.2 t/year of rags and 0.2 t/year of oiled rags are stored in metal containers and are transferred under the customer's contract;
- 0.6 t/year of spent oil stored in barrels on pallets / casing and transferred under the customer's contract;
- 0.1 t/year of filters are stored in metal containers and transferred for disposal under the customer's contract;
- 2.5 t/year of PET lids, 0.1 t/year PET contaminated tare and 0.7 t / year of mixed plastic are transferred for recycling;
- 0.2 t/year of worn shoes and 0.3 t/year of worn clothing are stored in metal containers and transferred to municipal landfill;
- 0.1 t/year of glass is stored in metal containers and is exported under the customer's contract;
- 140 t/year of domestic wastes are stored in containers at the site for waste containers with solid surfacing – when accumulated, they are transported to a landfill for solid household wastes under individually concluded contracts;
- 0,5 t/year of rubber products and 0,8 t/year of tires are transferred by the specialized company "Oblavtodor" (under the customer's contract) to be used for road construction, storage location – at the a warehouse with a shed;
- 0,1 t/year of abrasive materials are stored in metal containers and transported under the customer's contract;
- the pots from paint are stored in metal containers and transferred under the customer's contract;
- the wooden waste (pallets) are transferred for recycling;



- 80 pcs/year the used fluorescent lamps are transferred to a licensed enterprises for demercurization. Storage location - hermetically closed metal container

The annual quantity of the used fluorescent lamps for 450 installed lamps makes: with lightning for 24 hours/day, 60 days/year and the lamp's service life making 8000 hours:

450 x24x60 : 8000 = 80 pcs/year.

The used fluorescent lamps (80 pcs) belong to the first class of danger and are extremely hazardous, the other types of wastes are classified as third and fourth classes and make respectively moderate to low risk.

In the territory of the complex there is a warehouse with a shed and a metal-mesh fence for temporary storage of solid domestic wastes.

Taking into account that the storage and removal of the wastes is provided in accordance with the requirements of sanitary norms and safety regulations, it can be concluded that their impact on the environment will be negligible (within the applicable restrictions).

5. The assessment of impact on the social environment.

The site for the construction of the complex for agricultural products processing and storage "Eastern" of the FE "Organic Systems" is located within the limits of Snigurivka Municipal Council, Snigurivka district, Mykolayiv region.

The complex will contribute to the economic and social development of the town and provide the following benefits:

- stimulation of the development of the agricultural and industrial complex;
- ensuring additional payments to the local budget;
- new jobs (the planned activity implies the employment of 50 people for the period of construction, permanent employment of 95 people, and seasonal employment (taking into account the raw materials planting and harvesting), of 400-500 people with a high salary).

In the public discussion of the project, the local authorities and residents confirmed the positive impact of the planned activity on the social environment and their interest in the implementation of it as soon as possible. The customer took into account all the offers made by public representatives during the public hearing (in particular, informing local residents about the beginning of employment). The positive impact on the local level is significant.

Negative impact assessment

So as the impact of the planned activities on the environment are insignificant (whereof the local residents have been informed during the public hearing with the report delivered by the technical director of the customer's company and the executor of the EIA, the implementation of it will not cause any social tensions, especially taking into account that the nearest houses of Snigurivka town (1200m) are far beyond the legally required sanitary protection zone (100 m). The negative impact of the planned activities on the health of the local population is not forecasted, that is based on the EIA materials and the previous experience of the objects-analogues. There is no negative impact on the social environment.

Complex assessment of the impact on the social environment

Taking into account the significant positive and the absence of the negative impact, the planned activity will have positive impact on the social environment.

6. Assessment of impact on the technology related environment.

In the area of the construction and planned activities there are no houses, civil building, land, and underground facilities.

In general, the impact of the planned activities on the technology related is insignificant.

Factors of effect on the technical and natural elements in the process of implementation of the offered activity will be emission of mercury, methane, hydrocarbons, nitrogen oxide and carbon from the object operated. In combination with chemicals available the air and the moisture, the pollutants can have a certain effect on metals, building structures and so on.

Taking into account the small number and rather rapid dispersion of the emissions in a large area, we do not forecast an active and large-scale effect on the technology related environment.

There are no objects of the surrounding technology related environment, which could negatively adversely affect the planned activity.

The impact of emergency situations on the environment will be insignificant because they are relatively short. If an accident is detected, it will be immediately liquidated and repaired.

7. Measures necessary to secure the normative state of environmental safety.

In order to decrease the adverse impact on the environment by the object, the following measures will be taken:

- implementation of anti-noise measures;
- installation of "Biotal-20" unit for cleaning and disinfection of domestic waste water;
- storm water treatment facilities, the treated water is used for greenery watering;
- circulating water supply usage;
- separate storage of wastes in specially designated places;
- vehicles condition control regarding to the oil products spills;
- solid surfacing of roads, driveways and footpaths;
- usage of duly explosion and fireproof equipment where necessary
- installation of lightning rods and grounding devices;
- ensuring normative fire breaks between buildings and structures, installation of the alarm and fire extinguishing systems.
- collection and removal of domestic and industrial wastes following the established procedure;
- territory landscaping and greenery planting.

8. The complex assessment of impact of the designed activities on the environment and the characteristics of the residual impact.

The environmental impact assessment for the object designed, demonstrated that from the point of view of sufficiency, the object has the best measures to minimize the hazardous impact, which should be assessed as local and permissible.

During the period of the object construction, the risk of significant pollution of the atmosphere, soil, subsoil, groundwater and surface water is negligible.

The project includes the complex for resource-saving, protective, compensatory and security measures.

Resource-saving measures:

- highly efficient gas boilers (94.5% efficiency output) with economizer, transferring the heat of flue

- preboiler treatment, quality control and deaeration of the infeed water with automated regulation of the water level and steam pressure in deaerator, infeed water metering, in particular for the network replenishment and water treatment
- up to 15% natural gas savings with the transfer of heat from separator vapor to the water;
- automatic control of the gas combustion with the "gas-air" ratio, steam production as required where necessary, equipment and pipelines thermal insulation;
- water saving with the production system with water circulation; return of 90% of the steam condensate from consumers to the boiler room with the metering of it;
- condensate use for production and fields irrigation fields;
- the frequency of operation of the compressors from the bio-cleaning reactor;
- return of the decanter sludge to bio-cleaning reactor;
- reduction of the volume of plant waste, sand and excessive sludge by means of the dehydration with water return to circulation;
- treated domestic and storm water usage for irrigation;
- realization of 4680 t/ year of wastes from tomatoes sorting and 8400 t/year of cake as livestock fodder, transfer to the agricultural fields of 360 t/year of sand and 4535 t/y of sludge;
- water, electricity, steam and natural gas consumption metering with separate metering of those used for boilers;
- compensation of reactive power with the complete condenser units with automatic power control;
- an operative transition from natural gas to reserve fuel without the reconstruction of equipment, automatics and pipelines;
- transfer for processing of 11 tons/year of waste film and 10 tons/year of cardboard;
- disposal of or restoration of the housing of "Biotal-20" after the service life;
- usage of energy-saving lamps for illumination, collection of 80 used fluorescent lamps per year and their transfer for demercurization;
- normative values of heat transfer resistance of enclosing structures, sealing gaskets for window and door closures, arrangement of tambours for the external entrances.

Protective measures:

- boilers equipment with low toxicity burners with minimum accumulation of hazardous substances;
- low noise, sealed or closed technological equipment
- "Biotal-20" equipment for clarification and disinfection;
- removal of 1,0 m /year of sludge from the «Biotal» unit for the domestic waste water treatment to the company's agricultural fields as fertilizer or to the municipal treatment facilities for sewage water, where the accidental items and sand depositions from the unit acceptance tank (0,05 t/hour);
- solid surface for the territory, storm water treatment facilities;
- transfer for the disposal of 0,16 t/hour of the oil products from the storm water clarification;
- collection of 48 t/hour of SDW to containers at the site with solid surface where 7,9 t/year of sludge and 0,01 t/year of the remaining sorbent from the storm water treatment to landfill;
- arrangement of sanitary-protective area of 100 m from the complex border.

Compensational measures:

Payment of the special fee for environmental pollution.

Protective measures.

- monitoring of quality of the waste water under conract with district Sanitary Station

Complex ecological and economic appraisal of the impact
Separate estimates of the negative impact on the environment:

Environment component, impact sources	Operation		Taking out of operation	
	Negative impact	Savings, damage, hrn	Negative impact	Savings, damage, hrn
Climate, microclimate	no	no	no	no
Air	no	7960,6	no	no
Water: - water intake - waste water	no no	no no	no no	no no
Geological medium	no	no	no	no
Soil	no	no	no	no
Grounds at the site	no	no	no	no
Wastes placement	no	2296,3	no	no
Hazardous wastes	no	197400*	no	no
Flora	no	no	no	no
Fauna	no	no	no	no
Protected natural object	no	no	no	no
	Total:	207656,9	Total:	0,00

* used fluorescent lamps, containing mercury.

General assessment. The comparison of specific assessments of the types and levels of the object's impact on the environment in the context of the implementation of the set of measures aimed to ensure the normative state of the environment, makes it possible to conclude that the negative impacts on the environment and human activity are insignificant. There is no negative impact of the annual taking the complex out of operation.

All the necessary restrictions are maintained. The economic damage, defined as the amount of the special charge paid for pollution, is insignificant in money terms and it is negligible in comparison with potential economic and social benefits. The damage is compensated by the payment of this fee. The planned activity is appropriate and acceptable.

8.1 Risk assessment as for the impact of the planned activities on the environment.

Taking into account the object's capacity and the permissible emissions, we can conclude that the risk of significant air pollution resulting from the operational emissions is within the normal range.

The risk of soil and groundwater pollution will be insignificant, because of the solid surface within the territory and the collection of waste water.

The risk of surface water pollution is insignificant.

There is no risk of negative impact on the social environment.

Taking into account the location of the object within the industrial area, the risk of impact on the technology related c environment is insignificant.

The risk of high noise activities is within the normative limits.

The residual impact on the environment as a whole meets the requirements of the applicable environmental legislation of Ukraine.

8.1.1 Assessment of impact of the planned activities on the public health.

The assessment of risk to public health resulting from air pollution is based on the risk of development of the non-carcinogenic and carcinogenic effects according to the appendix to the addendum to paragraph 2.45 of DBN A.2.2-1-2003.

There are no carcinogenic substances in the emissions of the complex.

The risk of development of non-carcinogenic effects is determined by calculation of the hazard index. (No).

$HI = \sum^{HQ}_{i}$

where HQi – the risk indexes for specific substances

HQi= Ci/RfCi

Where Ci – calculated average annual concentration of I-substance, mg/m^3

RfCi – referent (safe) concentration, mg/m^3;

HQ = 1 threshold value of the risk accepted (p. 4.4 of the methodical recommendations of MR 2.2.12-142-2007 "Assessment of risk for public health from air pollution")

Risk index for specific substances:

Nitrogen dioxide $HQ_{NO2}=CNO_2/ RfCNO2-0,09/0,04=2,25$

Carbon oxide $HQ_{co}= CCo/TPC = 2,185/5=0,43$

Carbohydrates HQch=Cch/TPC = 0,56/1=0,56

According to clause 4.4.1 K4R 2.2.12-142-2007, if there are no reference doses / concentrations, the threshold permissible concentration (TPC) can be used.

Hazard indexes for individual substances (nitrogen dioxide) exceed the limit value.

Hazard indexes for individual pollutants (carbon oxide, hydrocarbons) do not exceed the limit value, the risk of harmful effects is considered to be insignificant.

The risk of harmful effects can not be considered as permissible, there is an insignificant probability of harmful effects for population.

$HI=\sum^{HQ}_{i} = 2,25+0,43 +0,56 = 3,24$

8.1.2 Assessment of the social risk of the planned activity.

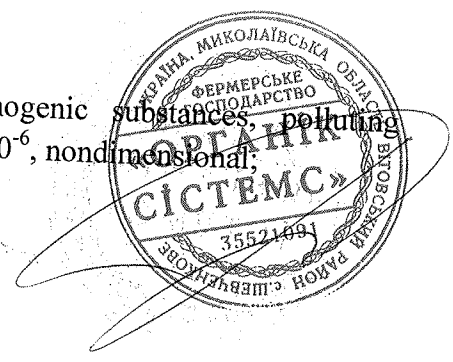
The social risk of the planned activity is defined as the risk for a group of people, which can be affected by the object, taking into account the peculiarities of the natural and technology related system.

The estimated value of social risk (Rs) is determined following the formula (I1):

$$R_s = CR_a x V_u x\ N/T x\ (1-N_p)$$

Where Rs is a social risk, person/year;

CR_a –carcinogenic risk with combined action of several carcinogenic substances, polluting atmosphere, determined according to appendix Ж or accepted CRa = 1x10^{-6}, nondimensional;



Vu - the vulnerability of the territory regarding air pollution, determined by the ratio of the object area for the economic activities to the area of the object with a sanitary protective zone, the fate units;

N – the quantity of population, defined: a) according to the data of the neighborhood, where the object is located, if they are available in the town; b) according to the data from the whole town, if there is no specific neighborhood or the object is critical for town formation; c) according to the data from towns and villages within the area influenced by the object designed if it is located beyond, persons;

T – average life duration (defined for this region or accepted as 70 years old) pers/year; the index determined following the formula (I2) for the construction of a new object and the formula (I3) for the object renovation, with no changes of the number of workplaces Np=0.

$$Np = \frac{\Delta Np}{N} \tag{i.2}$$

$$Np = \frac{\Delta Np}{Nrm} \tag{I.3}$$

Where Np – is the number of additional work places (decrease with «minus»);

N – accepted in formula (IL);

Nrm – previous number of work places

№т - предыдущее количество рабочих мест.

The assessment of social risk of the planned activities performed according to the table I. 1.

Table I.1 – classification of the levels of social risk

Risk Level	Risk During Life
Unacceptable for professionals and population	More than 10-3
Acceptable for professionals and unacceptable for population	$10^{-3} – 10^{-4}$
Conventionally acceptable	$10^{-4} - 10^{-6}$
Acceptable	Under 10^{-6}

$$Rs = 10^{-6} \times 0{,}35 \times \frac{1000}{70} \; x \; (1 - \frac{90}{1000}) = 4 \; x \; 10^{-6}$$

On the ground of the figure of social risk received the risk is taken as conventionally acceptable.

9. Assessment of impact on the environment during the object construction.

Construction site complex analysis

Expected duration of construction is 7 months. Natural conditions on the site allow construction completion within accepted plan. During preparatory period (1 month) the fencing of construction site and warning signs

are installed, electric cable is laid, security lighting installed, temporary premises for personnel, storage facilities, and water reservoirs are delivered. Sites allocated for the intake of concrete and storage of constructive elements. A fire-fighting post with primary fire-extinguishing tools, bio-toilets and waste containers installed.

Requirements concerning environmental preparation and territory protection.

Before construction, fertile layer of soil is skimmed by dozers into piles. Part of it is kept on site for landscaping, the rest is moved by trucks and stored in piles in the northern part of the complex area. The groundwork phase also includes ground levelling, preparations for underground cable and piping networks.

Requirements concerning access roads and parking sites for machines and vehicles

Temporary roads will be made with maximal usage of existing roads and, wherever possible, along future permanent roads. Construction machines and vehicles will be parked on the site of future parking lot.

Requirements concerning construction machines, rigging and lighting

Machines needed for construction: "Borex" digger, DT-75 dozer, truck mounted crane KS-5363, cranes MKG-25, KS-55727, "KATO" crane with 50m jib, 6m^3 mixers, tip trucks of 15, 20, 8, 5 tones capacity; air compressor PSRK 5-25, wielding transformer TD-500, area rammer GVR-1.25, deep vibrator S-413, road roller "AMKO" DOR-6631.

Machines are required to be fully serviceable, without leaks of lubricants or other liquids. No lighting other than security lighting is required as all the works will be done in daytime. Frames for concrete works are delivered as blocks ready to assemble. Constructive elements and plant equipment are delivered ready to install.

Requirements concerning temporary premises and storage facilities

Office, locker rooms and canteen are accommodated in prefabricated mobile premises. Personnel uses bio-toilets. Storage of spare parts, tools and packaged materials is organized in prefabricated mobile premises. Construction materials and constructive elements are stored in the open within construction site.

Requirements concerning disposal or utilization of waste and land rehabilitation

Construction waste, estimated as 70 tones (concrete debris, packaging, etc.) is disposed to the landfill, according to the contracts concluded beforehand.

Waste originating from construction is estimated as (according to the construction waste classifier DK-005-96) gravel – 6m^3, sand (code 4510.11.01) - 4 m^3, rock and soil mixture (code 4510.2.9.02) – 10m^3. No land rehabilitation is required.

Main sources and kinds of the negative environmental effects of construction are summarized in table 8.

Estimations of contaminating emissions into atmosphere during construction are presented in Appendix 5.

Requirements for the choice of technological solutions to kip environmental impact of construction within normative range.

The requirements are: soil preservation, maximal usage of existing roads and planning of temporary roads and parking lots in places of future permanent ones, minimal impact on groundwater, minimization of machines' working time using prefabricated constructive elements and pieces.

Estimation of the impact of construction on nature, human environment, nearby buildings and structures.

Simple estimations are made by studying construction of analogous objects. According to earlier studies of analogous cases, construction has local, short lasting and insignificant effects due to groundworks, inert waste, noise and emissions into atmosphere.

Atmospheric effects

During construction, some insignificant amount of harmful substances will be emitted (Nitrogen oxides, carbon monoxide, saturated hydrocarbons, sooth, sulfur dioxide, manganese and its compounds, iron oxide, inorganic dust containing 70-20% of SiO_2)

Emissions are transient, contamination is mostly compensated by the tax paid by the vehicles' owners proportionally to the amount of consumed fuel. Noise is limited by machines' working time and at the nearest residential area in Snigurivka (1200m from the construction site) is negligible. Thus, atmospheric impact is insignificant and transient, emissions are within normative range and compensated for. The prognosis is continuation of current state, with or without construction.

Effects on surface and ground water

As pits and trenches are dug above the groundwater level and construction personnel uses bio-toilets, there is little impact on local ground water. Indirect impact on the water system by the bio-toilet sewage disposed via sewage treatment system is negligible. Effects of other water usage on the construction site are within permissible range. The prognosis is continuation of current state, with or without construction.

Fertile soil, ground and geological environment

Fertile soil with average depth 0.3 m (total volume 46000 m^3) is removed, some part is kept on site for landscaping, the rest is moved by trucks and stored at the northern edge of the area. Negative impact on soils is insignificant.

Ground is affected by trenches and pits with depth of up to 3 m (for the bio-reactor and decanter of the water treatment and recycling facility) and area levelling. Digging, levelling and backfilling are done locally, without change of ground composition and transfer into or out of the area. Contamination of ground with petrochemicals should be prevented by controlling technical condition of machines and vehicles. Thus, the impact on the ground is minor. There are no effects on geological environment, since groundworks are not disruptive enough to trigger dangerous geological processes. Prognosis without construction: continuation of current state. Prognosis with construction: redistribution of soil within the complex area, redistribution of ground masses on the construction site with insertion of foundations and underground communications, without disruption of geological environment.

Effects on vegetation

Landscaping of the area, planting of trees and bushes, arrangement of lawns. Positive effect on vegetation.

Environment protection measures during construction

Removal of 46600 m^3 of soil, its use in local landscaping, storage for potential utilization for soil improvement.

Usage of bio-toilets with sewage disposal through the communal sewage treatment system.

Extensive use of prefabricated: concrete, rigging, constructive elements and equipment.

Provision of due control on the absence of leaks in construction machines and vehicles, proper maintenance and tune-up of engines to ensure compliance with exhaust gases standards.

Disposal of about 70 tones of construction waste to the landfill by the contract(s) concluded beforehand.

General assessment

Negative effects of construction on environment are insignificant. No effect on nearby buildings and structures. Acting regulations are complied with.

Residual effects: buildings and communications of the crops-processing complex on site, non-hazardous construction waste on the landfill.

Table 7

ХАРАКТЕРИСТИКА ВОЗМОЖНЫХ ПОВРЕЖДЕНИЙ РАЗЛИЧНЫХ МАТЕРИАЛОВ

Materials	Type of damage	Main pollutants	Other environmental actors среды
Metals	Corrosive darkening	Acid gases	Moisture, air, salts
Stonework	Surface erosion	Acid gases	Moisture, temperature difference, salts, vibration, CO_2

Sources, types and objects of impact.

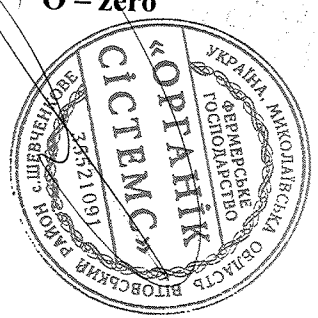
Works, operations	Type of impact	Objects Impacted					
		Air	Soil	Plants	Surface and ground water	Intensiveness	Scale
Construction stage							
Transport	Oil, fuel leak	к	П	П	П	weak	local
	Exhaust gases emission	п	О	К	О	weak	local
	Acoustic (noice)	О	О	О	О	weak	local
Land	Soil removal	К	п	п	О	weak	local
Construction and installation	Welding aerosol emission, solvents, hydrocarbons	п	к	к	к	weak	local
Emergency Situation							
Fire	Ash, nitrogen oxide, carbon, sulfur emissions	п	п	п	к	significant	local
Leaks in domestic sewage	Untreated domestic waste water	к	п	О	п	weak	local

Note

П – direct impact

К – indirect impact

О – zero



Assignment for Development. Information in Mass Media.
Statement on Environmental Consequences.

CONFIRMED
PE BILA P.M.

APPROVED

ASSIGNMENT FOR THE EIA MATERIALS DEVELOPMENT

Customer / Contractor	Object	"Economic Complex for Agricultural Product Processing and Storage "Eastern" of FE "Organic Systems"
	Contractor	PE Bila P.M.
	List of co-executors	-
	Construction type	New construction
	Location	Snigurivka town, Mykolayiv region
	Design stage	Pre-design
	List of the sources of impact	Gas boiler (fume gases), GRP, breathing valve of fuel reservoir (FR), road transport (exhaust gas),
	List of expected negative impacts	Insignificant (within normative values) impact on environment
	List of environment components subject to estimation	Geological environment, water, air, microclimate, soil, flora and fauna
	Requirements to scope and milestones EIA	Full volume
	Requirements on public participation	Informing public on construction via local mass media
	Additional requirements	No
	Performance procedure and terms for EIA materials preparation	At the time of project development According to DBN A.2.2-1-2003

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STATEMENT ON ECOLOGICAL CONSEQUENCES

The purpose of the planned activity is the agricultural product storage and processing. It is performed by means of construction and operation of the complex for agricultural product processing and storage "Eastern" of FE "Organic Systems" located in the territory of Snigurivka village council, Snigirevka town, Mykolayiv region for processing 180.0 thousand t/year of fresh tomatoes and 27, 0 thousand t/year of tomato paste on 12.0 hectares land plot.

The technological process includes fresh tomatoes washing and sorting, juice extraction by means crushing and rubbing, juice evaporation to a tomato paste, sterilization and packing into drums with polyethylene bags. The complex consists of: weighting, parking site for cargo truck, the tomato acceptance area, the water treatment area, the production building (including laboratory, transformer substation, containers preparation site, warehouses for containers and chemical reagents, operator's room, offices, etc.), the processing equipment (washers, extractors, sterilizers, Apollo vacuum evaporator, aseptic fillers, etc.), sheds, cooling towers, boiler room, gas distribution point (GDP), warehouse site for finished products; administrative building, vehicles parks, "Biotal" domestic waste water treatment facility; storm water and circulating water treatment facility. The complex works seasonally 60 days / year, 24 hours / day. There are similar complexes in Gola Prystan, Kherson region and in Shevchenkovo village, Vitovskyi district, Mykolayiv region. They do not make significant impact on the environment and living conditions.

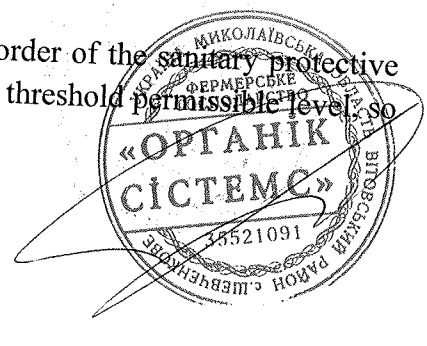
The construction will cause the following ecological consequences: 0,3 m of the fertile soil layer under the construction site is removed and stored at the complex; later it will be used for landscaping and agricultural fields improvement; 70 tons of non-hazardous construction waste will be transported to the landfill for solid domestic wastes disposal; the impact on air will be insignificant in the form of noise and harmful substances emissions of harmful substances. The development of soil up to the depth of 4 m will not cause negative geological processes and will not affect ground waters situated much lower. The territory landscaping will have positive impact on the local plants.

Water will be supplied from the Ingulets irrigation system with water clarification to food quality. In case of breakdown in water supply on hot days in order to guarantee the necessary water quantity, there will be reserve water supply from artesian wells (designed separately). There is no discharge of waste water to the water environment. During operation, the emission to the air will be the following: 10,47 t / year of harmful substances, including those from the boiler room and gas distribution - 2.47 t / year of nitrogen dioxide, 7.26 t / year of carbon oxide; 0.00001 t / year of mercury, 0.75 t / year methane, minor amounts of nitrogen, hydrochloric and sulfuric acid vapors, as well as 4790.6 t / year of greenhouse gases (mainly carbon dioxide); from motor transport (exhaust gases) - pollutants - nitrogen dioxide - 0.05 t / year, carbon monoxide - 0.083 t / year; hydrocarbons - 0.0037 t/year., from fuel (fuel tank and column) - pollutants - hydrocarbons - 0.047 t / year.

Additional special measures to prevent or reduce the formation and emission of air pollutants are not planned after calculation, since the contribution of the emission from the object is insignificant and does not exceed the threshold permissible levels.

The maximum concentrations of harmful substances in the air at the border of the sanitary protective zone (100 m) and in the residential area of Snigurivka will not exceed the threshold permissible level, so the air pollution and noise are insignificant.

There are no negative effects on soil, flora and fauna during operation.



Stopping the operation of the complex at the end of the seasonal cycle is performed without adverse effects on the environment by means of pumping water from the bioreactor into the decanter, bioreactor inspection, dehydration and transfer of sludge from the decanter to the fields as a fertilizer and storing the remaining water in it until the next production cycle .

Activities to guarantee the implementation of the planned activities in accordance with environmental standards and regulations:

- gas boilers with a high efficiency of (94.5%), low-toxicity burners and an economizer transferring flue gas heat to incoming water;
- saving of natural gas due to heat transfer from the separator vapour to the water; Automatic control of the gas combustion with the "gas-air" ratio with a separate metering of the consumption of electricity, steam and natural gas with separate technological metering for boilers;
- return of 90% of the steam condensate from consumers to the boiler, taking into account the metering;
- preboiler treatment, quality control and deaeration of infeed water with automated control of water level and steam pressure in deaerator;
- return of the 90 % of steam condensate from the customers to the boiler room;
- use of the condensate from juice evaporation in the production and watering fields;
- water saving by means of the circulating water supply system;
- the frequency of operation of the reactor compressors of water treatment facilities for circulation water, the return of sludge from decanter to the reactor, the return of water to circulation with dehydration of plant waste, sand and excess sludge;
- use of 4680 t / year of the tomato sorting wastes, 8400 t / year of cake for livestock fodder, transfer to agricultural fields of 360 t / year of sand and 4535 t / year of sludge;
- use of treated domestic and storm waste water for irrigation;
- removal of 163 units / year of packaging from chemical reagents for reusal;
- normative values of heat transfer resistance of enclosing structures, sealing gaskets in the adjoining windows and doors, equipment of external entrances by tambours;
- transfer for processing of 11 tons / year of film and 10 tons / year of cardboard wastes;
- using energy saving lamps with the delivery of 80 pieces/year of used fluorescent lamps for demercurization;
- low noise, sealed or enclosed equipment;
- corrosion-resistant materials for equipment and pipelines;
- waterproofing of underground parts of circulating water treatment facility;
- automatic installation of "Biotal-20" household sewage treatment facility;
- rainwater drainage to treatment facilities;
- transfer for the disposal of 0.011 t / year of oil products from storm water for treatment;
- removal of 70 tons of solid wastes per year; 7.9 t / year of sediment and 0.01 t / year of sorbent from storm water treatment;
- establishment of a sanitary protective zone on 100 m from the border of the complex;
- treated wastewater quality monitoring following the agreement with the district power station;
- an integrated approach to solutions aimed to prevent accidents and improve manufacturing safety;
- safety explosion valve, easily flushing surfaces of the boiler room glazing;
- installation of a diesel generator for emergency lighting, fire water supply of treatment plants to prevent the death of microorganisms and electricity breakdown;

- fire-fighting measures (fire-retardant treatment of load-bearing structures and ventilation if necessary, fire-prevention couplings in places for engineering communications with fire-prevention measures; the availability of fire safety water, the internal fire extinguishing system in the boiler room, the fire water pipe, fire breaks between the buildings and facilities of the complex, the implementation of evacuation routes in accordance with applicable standards, roadways for firefighters' trucks to the buildings and facilities of the complex, the equipment of the complex with primary fire extinguishing means, lightning protection, protective earthing, protective shutdown.

- control, automatic regulation and alarm systems:

- automatic fire alarm system;

- automatic regulation of gas combustion and boiler water supply;

- automatic shutdown of boilers and gas supply in case of gas contamination, fire, burner flame extinction and voltage failure and the work of an applicable alarm;

- automatic control of circulation water treatment facilities.

The implemented set of design solutions is optimal and meets the requirements of the best practices. The risks of negative impact on the natural, social and technology related environment are insignificant. The residual impacts - non-hazardous construction and solid wastes at the landfill for solid domestic waste disposal.

The public has been informed in advance of the planned activity (publication of the statement of intent in the newspaper "Snigurivshchina News " dated 22.09.2016). The planned activities were supported by the local public during the public hearing on October 24, 2016.

To ensure the normative state of the environment, the customer undertakes to implement the design decisions in accordance with the norms and rules of environmental protection and environmental safety requirements at all stages of the facility construction and operation.

The customer undertakes to transfer the statement on ecological consequences for the follow-up consequences to the local government bodies.

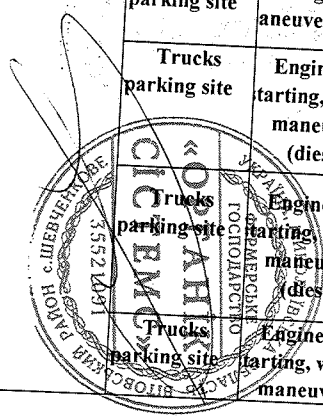
Customer *-signed-* ***Official seal applied***	Contractor: *-signed-* ***Official seal applied***

Appendixes

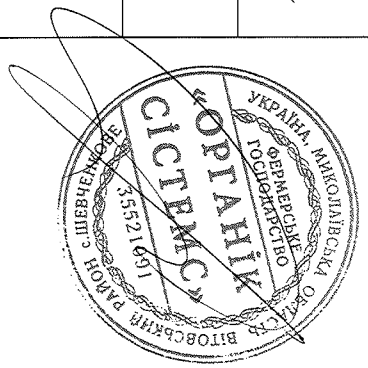

УКРАЇНА, МИКОЛАЇВСЬКА ОБЛАСТЬ
ФЕРМЕРСЬКЕ ГОСПОДАРСТВО
«ОРГАНІК СІСТЕМС»
35521091

The list of pollutants, their quantity and emission parameters

Production	Site	Pollutants source веществ		h/year	Pollutant source	No	Source h	Pipe d	Parameter of air and gas mixture after the pollutant source			Coordinates м		Pollutants emission.							
		Name	pcs						Speed m/s	Volume m^3/s	Tempo	X	У	Substance	Before measures			After measures			
															g/s	mm/m³	g/year	g/s	mm/m³	g/year	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	
Processing and storage complex	Boiler room	BOSH boiler	2	1440	Chimney	001	23,33	1,0	6	4,7	146	15	175	Nitrogen dioxide	-	-		1,28		2,45	
														Carbon oxide	-	-	-	3,95		7,18	
														Nitrogen oxide	-	-	-	0,0015		0,008	
														Mercury	-	-	-	0,0000015		0,00001	
														Methane	-		-	0,015		0,08	
	Vehicles (weighting)	Engines during starting, warming, maneuvering (diesel)	2	1440	Vehicles exhaust pipe	002	1	0,08	1	0,005	30	130 190	5 15	Carbon oxide	-	-	-	0,0268	-	0,002	
														Hydrocarbons	-	-	-	0,0161	-	0,001	
														Nitrogen dioxide	-	-	-	0,008	-	0,01	
	FD	Reservoir for diesel fuel 8 m^3	1	1440	Breathing valve of reservoir	003	3,5	0,05	1	0,005	35	223	-10	Threshold hydrocarbons	-	-	-	0,4	-	0,0022	
	FD	Fuel dispenser (diesel fuel)	1	1440	Crane	004	2	0,05	1	0,0006	35	225	-9	Threshold hydrocarbons	-	-	-	0,12	-	0,0052	
	Trucks parking site	Engines during starting, warming, maneuvering (diesel)	24	1440	Vehicles exhaust pipe	005	1	0,08	1	0,005	30	405 617	22 36	Carbon oxide	-	-	-	0,0268	-	0,023	
														Hydrocarbons	-	-	-	0,0161		0,014	
														Nitrogen dioxide	-	-	-	0,007	-	0,008	
	Trucks parking site	Engines during starting, warming, maneuvering (diesel fuel)	17	1440	Vehicles exhaust pipe	006	1	0,08	1	0,005	30	412 642	57 67	Carbon oxide	-	-	-	0,0268	-	0,016	
														Hydrocarbons	-	-	-	0,0161		0,0017	
														Nitrogen dioxide	-	-	-	0,008	-	0,009	
	Trucks parking site	Engines during starting, warming, maneuvering (diesel fuel)	8	1440	Vehicles exhaust pipe	007	1	0,08	1	0,005	30	375 395	61 68	Carbon oxide	-	-	-	0,1	-	0,028	
														Hydrocarbons	-	-	-	0,0125		0,0036	
														Nitrogen dioxide	-	-	-	0,008	-	0,001	
	Trucks parking site	Engines during starting, warming, maneuvering	6	1440	Vehicles exhaust pipe	008	1	0,08	1	0,005	30	307 319	79 82	Carbon oxide	-	-	-	0,1	-	0,02	
														Hydrocarbons	-	-	-	0,0125		0,0027	



			4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
														Nitrogen dioxide	-	-	-	0,008	-	0,001
			2	5 сек	Cold vents	009	2	0,034	1	0,001	30	-15	164	Methane				0,13		0,67
		Engines during starting, warming, maneuvering (diesel fuel)	4	1440	Vehicles haust pipe	010	1	0,05	1	0,002	30	39 112	15 55	Carbon oxide				0,0268		0,003
														Hydrocarbons	-	-	-	0,0161		0,002
														Nitrogen dioxide	-	-	-	0,008		0,001



28 g/sec

1.2. Carbon oxide emission calculation

The indicator of carbon oxide emmission is defined with the formula:

$$K_{co} = (K_{co})_0 \times (1 - q_4/100), \text{ g/GJ};$$

where $(K_{co})_0$ = 250 g/GJ, the generalized indicator of CO emmission with no mechanical incompleteness of the fuel combustion (table D.19 Appendix D);

q_4 = 0,5%, the fuel heat loss because of the mechanical incompleteness of the fuel combustion (%) depending on the specific characteristics of boilers (tables D3 and D4 appendix D).

$$K_{co} = 250 \times (1-0,995/0,005) = 250 \text{ g/GJ}$$

According to the formula (1) the gross emission of carbon oxide ECO make:

$E_{co} = 10^{-6} \times K_{co} \times Q^r \times B = 10^{-6} \times 250 \times 46,17 \times 1777 = 7,18$ t/year Maximum single emmission:

$$E_{co} = 10^{-6} \times 250 \times 46,17 \times 343 = 3,95 \text{ g/sec}$$

2. Heavy Metals

2.1 Mercury Emission Calculation

The emission index for the heavy metal – mercury k_{Hg} is calculated on the ground of formula:

$k_{Hg} = (k_{Hg})_0 (1 - n_{3y})$, g/GJ

where $(k_{Hg})_0$ - 0,0001 g/GJ, the index for the mercury emmission without the unit for ash catching (table D.17 appendix D);

n_{3y} – 0% - mercury catching efficiency in the ash catching unit (table D.14 Appendix D)

$$k_{Hg} = 0,0001 \times (1-0) = 0,0001 \text{ g/GJ}$$

According to the formula (1) gross emission of mercury E_{Hg} make:

$E_{Hg} = 10^{-6} \times k_{Hg} \times Q^r_i \times B = 10^{-6} \times 0,0001 \times 46,17 \times 1777 = 0,00001$ t/year

Maximum single time emission:

$E_{Hg} = 10'^{6} \times 0,0001 \times 46,17 \times 343 = 0,0000015$ g/sec

3. Greenhouse gases

3.1 CO_2 emission calculationРасчет

The CO_2 emission index k_{CO2} at the time of natural gas combustion is defined following the formula (20):

$$k_{CO2} = \frac{44}{12} \times \frac{Cr}{100} \times \frac{10}{Qir} Ec = 3,67 k_c Ec \text{ g/GJ};$$

where Cr = 73,67% - wheited content of CO_2 for the working mass;

Ec = 0,995 – the level of fuel carbon oxidation (appendix A);

$\kappa C = \frac{Cr}{100} \times \frac{10}{Qir}$ - emission index for the fuel carbon, g/GJ

$$k_{CO2} = 44/12 \times 73,67/100 \times 10^6/46,03 \times 0,995 = 58390,77 \text{ г/ГДж}$$

The gross emission of E_{co2} make:

$E_{co2} = 10^{-6} \times k_{CO2} \times Q^r_i \times B = 10^6 \times 58390,77 \times 46,17 \times 1777 = 4790,6$ т/год

Maximum single time emission:

$$E_{co2} = 10^{-6} \times 58390,77 \times 46,17 \times 343 = 924,7 \text{ г/сек}$$

3.2 Nitrogen oxide emission calculation.

The emission of the nitrogen oxide dioxide K_{N2O} makes 0,1 g/GJ (table D21 Appendix D).

According to the formula (1) the gross emission of nitrogen oxide dioxide E_{N2O} make:

$$EN\mathbf{20} = 10^{-6} \times K_{N2O} \times Q^r \times B = 10^{-6} \times 0{,}10 \times 46{,}17 \times 1777 = 0{,}008 \text{ t/year}$$

Maximum single time emission:

$$EN\mathbf{20} = 10^{-6} \times 0{,}10 \times 46{,}17 \times 343 = 0{,}0015 \text{ g/sec}$$

3.3 Methane emission calculation

The k_{CH4} methane emission index makes 1,0 g/GJ (table D22 appendix D).

According to the formula (1) the gross emission of methane E_{CH4} make:

$$Ech\mathbf{4} = 10^{-6} \times k_{CH4} \times Q^r \times B = 10^{-6} \times 1{,}0 \times 46{,}17 \times 1777 = 0{,}08 \text{ t/year}$$

Maximum single time emission:

$$Ech\mathbf{4} = 10^{-6} \times 1{,}0 \times 46{,}17 \times 343 = 0{,}015 \text{ g/sec}$$

Calculation of pollutants emission
from road vehicles (vehicles weighting device)

Source 002.

- Road transport - 2 cars.

Main type of fuel - diesel.

Defining the pollutant emissions from motor vehicles was performed according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The maximum single time emission is determined following the formula:

$$M_i^{Mp} = 1.3 * Q * p * \Pi xx * A_{cn}, \text{ g/s}$$

Where ***Q*** - is the normative fuel consumption of specified car for 1 km, l/km;

P – diesel fuel density, kg / l;

A_{cn} - number of cars of the calculated group;

Π_{xx} – coefficient, characterizing the ratio of the pollutant mass, released to the mass of fuel burned; see the table:

Fuel type	N0	Пхх CO	CH
Diesel fuel	0,03	0,1	0,06

The annual emission rate is calculated on the ground of formula:

$$M_i^{Mp} = 1.3 * Q * p * \Pi xx * T * A_{cn} * 10^{-6}, \text{ t/year}$$

Where T — time of the vehicle's engine work, sec.

The calculation of maximum single time emission is made for one vehicle of the group subject to calculation, the annual emission – for all the vehicles of the group.

Calculation of the emission from diesel trucks:

Q = 0,25 l ; p = 0,825; A_{cn} = 2; T_P = 60;

M^{Mp}_{co} = 1,3 x 0,25 x 0,825 x 0,1 x 1 = 0,0268 g/sec

c = 1,3 x 0,25x 0,825 x 0,1 x 600 x 2 x 60 x 10^{-6} = 0,002 t/year

M^{Mp}_{CH} = 1,3 x 0,25 x 0,825 x 0,06 x 1 = 0,0161 g/sec

$M^{год}_{CH}$ = 1,3 x 0,25 x 0,825 x 0,06 x 600 x 2 x 60 x 10^{-6} = 0,001 t/year

$M^{mp}_{NO2} = 1,3 \text{ X } 0,25 \text{ X } 0,825 \text{ x } 0,03 \text{ x } 1 = 0,0080$ g/sec

$M^{год}_{NO2} = 1,3 \text{ x } 0,25 \text{ x } 0,825 \text{ x } 0,03 \text{ x } 600 \text{ x } 2 \text{ x } 60 \text{ x } 10^{-6} = 0,001$ t/year

Calculation of the pollutants emissions from sources of the container type FDP

Source 003.

The calculation was carried out on the basis of the "Methodology for calculation of the emissions of harmful substances into the air at the companies of the Goskomnefteprodukt of RSFSR", Astrakhan, 1988, and the Decree of the USSR State Council dated 21.03.86 No. 4 "On approval of the norms of natural loss of petroleum products during reception, storage, and transportation ".

The main sources of hydrocarbon emissions are the storage of diesel fuel (8 m^3) and fuel dispenser.

Mode of operation – 24 hour/day, 60 days/year (seasonal work of the enterprise).

1.1 Emissions from the fuel storage tank consist of the emission during the storage (natural loss) and he emission during tanks filling.

The natural loss emission is defined on the ground of formula:

$M_{год} = (П_1 \times G_{в.л} + п_2 \times G_{о.з.}) \times 10^{-3}$, where:

Пi and П2 – norms of the natural loss of oil products during spring-summer and autumn-winter periods for the applicable climate;

$G_{в.л.}$ and $G_{о.з.}$ – the volumes for the oil products storage during applicable periods for the underground tanks.

For diesel fuel: $П_1 = 0,02$ kg/t, $П_2 = 0,02$ kg/t.

Annual realization of diesel fuel - 22 t/ year.

Diesel fuel: $M_{год} = 11 \times (0,02 + 0,02) \times 10^{-3} = 0,00044$ t/year

$M_{мр} = M_{год} \times 10^6/3600 \times T = 0,00044 \times 10^{-6}/3600 \times 24 \times 60 = 0,00008$ g/s

Emission at the time of reservoir filling is defined on the ground of formula:

M = V x C , where

V – the volume of the gas and air mixture, released from the tank for a unit of time;

C – concentration of hydrocarbons in the emission, g/m^3.

Diesel fuel: C = 100 g/s^3; V = 0,004 m3/sec

M = 100 x 0,004 = 0,4 g/sec.

$M_{год} = M \times T/10^6$, where

T – time for tank filling, sec/year

The speed for tank filling - 4 m^3/for 15 minutes.

For diesel fuel T = 5400 sec/year.

Diesel fuel $M_{год}=0,4 \times 5400/10^6 = 0,0022$ t/year

Source 004.

1.2 Fuel distributor emisssion.

Diesel fuel - 1 unit.

The effiency of fuel dispenser for the vehicles fueling 40 l/min, i.e. V = 0,0006 m^3/sec.

The carbohydrates concentration in the air and gas mixture emisssion during the fuel tank filling C = 200 g/m (diesel fuel).

M = 0,0006 x 200 = 0,12 g/s – from one fuel distributing unit (diesel fuel).

from one FD M = 0,12 x 1 =0,12 g/sec

T = 12 h/year (diesel fuel).

Diesel fuel $M_{год}$ = 0,12 x 3600 x $12/10^6$ = 0,0052 t/year.

Calculation of the pollutants emission from the vehicles engines during fueling.

The Calculation is made according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The quantity of cars fueled at a time - 1. Time necessary to come to and from the station - 0,5 min., total 1 min. (0,0167 hour.).

Number of fuels per day - 24 vehicles 15 l of petrol each (21,6 t/hour), 1440 з/year – diesel fuel.

Max gross pollutants emission during fueling is defined on the ground of formula:

$M=(160+13,5B)\frac{P \times T}{6000}$: P_{co} = 0,05%; P_{NO} =0,035%, T=1min.; B = 2,5 l.

Carbon oxide

$M=(160+13,5x\ 2,5)\frac{0,05 \times 1}{6000}$ = 0,0016 kg/h =0,00045g/s

Nitrogen dioxide

$M=(160+13,5x\ 2,5)\frac{0,035 \times 1}{6000}$ = 0,0011kg/h =0,00019 g/s:

Hydrocarbons

$M=(160+13,5x\ 2,5)\frac{0,009 \times 1}{6000}$ = 0,0003 kg/h =0,0001 g/s:

Annual gross emission

Carbon oxide $M_{год}$= 0,0016x720x0,0167x10^{-3} = 0,00001 t/year

Nitrogen dioxide $M_{год}$= 0,0011x720x0,0167x10^{-3}= 0,00001 t/year

Hydrocarbons $M_{год}$= 0,0003x720x0,0167x10^{-3}= 0,000004 t/year

Calculation of pollutants emission
from road vehicles (temporary parking for trucks)

Source 005.

- Road transport - 24 cars.

Main type of fuel - diesel.

Defining the pollutant emissions from motor vehicles was performed according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The maximum single time emission is determined following the formula:

$$M_i^{Mp} = 1.3 * Q * p * Пхх * A_{сп}, \text{ g/s}$$

Where ***Q*** - is the normative fuel consumption of specified car for 1 km, l/km;

P – diesel fuel density, kg / l;

$A_{сп}$ - number of cars of the calculated group;

$П_{хх}$ – coefficient, characterizing the ratio of the pollutant mass, released to the mass of fuel burned; see the table:

Fuel type		Пхх	
	N0	CO	CH
Diesel fuel	0,03	0,1	0,06

The annual emission rate is calculated on the ground of formula:

$M_i^{Mp} = 1.3 * Q * p * П_{хх} * T * A_{сп} * 10^{-6}$, t/year

Where *T* — time of the vehicle's engine work, sec.

The calculation of maximum single time emission is made for one vehicle of the group subject to calculation, the annual emission – for all the vehicles of the group.

Calculation of the emission from diesel trucks:

Q = 0,25 l; p = 0,825; $A_{сп}$ = 24; T_P = 60;

M^{Mp}_{co} = 1,3 x0,25 x 0,825 x 0,1 x 1 = 0,0268 g/sec

$M^{год}_{CH}$ = 1,3 x 0,25x 0,825 x 0,1 x 600 x 24 x 60 x 10^{-6} = 0,0023 t/year

M^{Mp}_{CH} = 1,3 x 0,25 x 0,825 x 0,06 x 1 = 0,0161 g/sec

$M^{год}_{CH}$ = 1,3 x 0,25 x 0,825 x 0,06 x 600 x 24 x 60 x 10^{-6} = 0,014 t/year

M^{mp}_{NO2} = 1,3 X 0,25 X 0,825 x 0,03 x 1 = 0,0080 g/sec

$M^{год}_{NO2}$ = 1,3 x 0,25 x 0,825 x 0,03 x 600 x 24 x 60 x 10^{-6} = 0,007 t/year

Calculation of pollutants emission from road vehicles (temporary parking for trucks)

Source 006.

- Road transport - 17 cars.

Main type of fuel - diesel.

Defining the pollutant emissions from motor vehicles was performed according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The maximum single time emission is determined following the formula:

$$M_i^{Mp} = 1.3 * Q * p * Пхх * A_{сп}, \text{ g/s}$$

Where ***Q*** - is the normative fuel consumption of specified car for 1 km, l/km;

P – diesel fuel density, kg / l;

$A_{сп}$ - number of cars of the calculated group;

$П_{хх}$ – coefficient, characterizing the ratio of the pollutant mass, released to the mass of fuel burned; see the table:

Fuel type		Пхх	
	N0	CO	CH
Diesel fuel	0,03	0,1	0,06

The annual emission rate is calculated on the ground of formula:

$M_i^{Mp} = 1.3 * Q * p * П_{хх} * T * A_{сп} * 10^{-6}$, t/year

Where T — time of the vehicle's engine work, sec.

The calculation of maximum single time emission is made for one vehicle of the group subject to calculation, the annual emission – for all the vehicles of the group.

Calculation of the emission from diesel trucks:

Q = 0,25 l; p = 0,825; $A_{сп}$ = 17; T_P = 60;

$M^{Mp}_{CO} = 1,3 \text{ x} 0,25 \text{ x } 0,825 \text{ x } 0,1 \text{ x } 1 = 0,0268$ g/sec

$M^{год}_{CH} = 1,3 \text{ x } 0,25\text{x } 0,825 \text{ x } 0,1 \text{ x } 600 \text{ x } 17 \text{ x } 60 \text{ x } 10^{-6} = 0,016$ t/year

$M^{Mp}_{CH} = 1,3 \text{ x } 0,25 \text{ x } 0,825 \text{ x } 0,06 \text{ x } 1 = 0,0161$ g/sec

$M^{год}_{CH} = 1,3 \text{ x } 0,25 \text{ x } 0,825 \text{ x } 0,06 \text{ x } 600 \text{ x } 17 \text{ x } 60 \text{ x } 10^{-6} = 0,009$ t/year

$M^{mp}_{NO2} = 1,3 \text{ X } 0,25 \text{ X } 0,825 \text{ x } 0,03 \text{ x } 1 = 0,0080$ g/sec

$M^{год}_{NO2} = 1,3 \text{ x } 0,25 \text{ x } 0,825 \text{ x } 0,03 \text{ x } 600 \text{ x } 17 \text{ x } 60 \text{ x } 10^{-6} = 0,005$ t/year

Calculation of pollutants emission from temporary parking for vehicles

Source 007. Parking for 8 vehicles

Defining the pollutant emissions from motor vehicles was performed according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The maximum single time emission is determined following the formula:

$M_i^{Mp} = G_i\ A_{сп}$, g/sec

$G_i = 1{,}3\ Q\ p\ Пхх$

Where G_i – is the mass of the emission of i- pollutants for the cycle of engine for starting, maneuvering of one car, g/s:

Q - is the normative fuel consumption of specified car for 1 km, l/km;

P – fuel density (kg / l); petrol p=0,74, diesel fuel p=0,825

$A_{сп}$ - number of cars of the calculated group;

$П_{хх}$ – coefficient, characterizing the ratio of the pollutant mass, released to the mass of fuel burned; see the table:

Fuel type	CO	Пхх CII	NO
Petrol	0,8	0,1	
Diesel fuel	0,1	0,06	0,03

The annual emission rate is calculated on the ground of formula:

$M^{год} = G_i\ A_{сп}\ T_c\ T_p\ 10^{-6}$ t/year

Where T_c = 600 c — the average time of the vehicle's engine work within the parking, sec.

T_p – number of entries of one vehicle per year;

The calculation of maximum single time emission is made for one vehicle of the group subject to calculation, the annual emission – for all the vehicles of the group.

a) calculation of the vehicle emission (carburetor engine):

Q = 0,13 l; p = 0,74; $A_{сп}$ = 6; T_P = 60;

$M^{Mp}_{CO} = 1{,}3$ x0,13 x 0,74 x 0,8 x 1 = 0,1000 g/sec

$M^{год}_{CH} = 1{,}3$ x 0,13x 0,74 x 0,8 x 600 x 6 x 60 x 10^{-6} = 0,022 t/year

$M^{Mp}_{CH} = 1{,}3$ x 0,13 x 0,74 x 0,10 x 1 = 0,0125 g/sec

$M^{год}_{CH} = 1{,}3$ x 0,13 x 0,74 x 0,10 x 600 x 6 x 60 x 10^{-6} = 0,003 t/year

$M^{mp}_{NO2} = 1{,}3$ X 0,13 X 0,74 x 0,10 x 1 = 0,0125 g/sec

$M^{год}_{NO2} = 1{,}3$ x 0,13 x 0,74 x 0,10 x 600 x 6 x 60 x 10^{-6} = 0,003 t/year

Calculation of the emission from vehicles (diesel engine):

Q = 0,08 l; p = 0,825; $A_{сп}$ = 2; T_P = 60;

M^{Mp}_{co} = 1,3 x0,08 x 0,825 x 0,1 x 1 = 0,0086 g/sec

$M^{год}_{CH}$ = 1,3 x 0,08 x 0,825 x 0,1 x 600 x 2 x 60 x 10^{-6} = 0,006 t/year

M^{Mp}_{CH} = 1,3 x 0,08 x 0,825 x 0,06 x 1 = 0,0051 g/sec

$M^{год}_{CH}$ = 1,3 x 0,08 x 0,825 x 0,06 x 600 x 2 x 60 x 10^{-6} = 0,0004 t/year

M^{mp}_{NO2} = 1,3 X 0,08 x 0,825 x 0,03 x 1 = 0,0026 g/sec

$M^{год}_{NO2}$ = 1,3 x 0,08 x 0,825 x 0,03 x 600 x 2 x 60 x 10^{-6} = 0,0002 t/year

УКРАЇНА, МИКОЛАЇВСЬКА ОБЛАСТЬ ВІТОВСЬКИЙ РАЙОН с.ЛЕВЧЕНКОВЕ
ФЕРМЕРСЬКЕ ГОСПОДАРСТВО
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Calculation of pollutants emission from temporary parking for vehicles

Source 008. Parking for 5 vehicles

Defining the pollutant emissions from motor vehicles was performed according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The maximum single time emission is determined following the formula:

$M_i^{Mp} = G_i\ A_{сп}$, g/sec

$G_i = 1{,}3\ Q\ p\ Пхх$

Where G_i – is the mass of the emission of i- pollutants for the cycle of engine for starting, maneuvering of one car, g/s:

Q - is the normative fuel consumption of specified car for 1 km, l/km;

P – fuel density (kg / l); petrol p=0,74, diesel fuel p=0,825

$A_{сп}$ - number of cars of the calculated group;

$П_{хх}$ – coefficient, characterizing the ratio of the pollutant mass, released to the mass of fuel burned; see the table:

Fuel type	CO	Пхх CH	NO
Petrol	0,8	0,1	
Diesel fuel	0,1	0,06	0,03

The annual emission rate is calculated on the ground of formula:

$M^{год} = G_i\ A_{сп}\ T_c\ T_p\ 10^{-6}$ t/year

Where T_c = 600 c — the average time of the vehicle's engine work within the parking, sec.

T_p – number of entries of one vehicle per year;

The calculation of maximum single time emission is made for one vehicle of the group subject to calculation, the annual emission – for all the vehicles of the group.

a) calculation of the vehicle emission (carburetor engine):

Q = 0,13 l; p = 0,74; $A_{сп}$ = 3; T_P = 60;

$M^{Mp}_{co} = 1{,}3$ x0,13 x 0,74 x 0,8 x 1 = 0,1000 g/sec

$M^{год}_{CH} = 1{,}3$ x 0,13x 0,74 x 0,8 x 600 x 3 x 60 x 10^{-6} = 0,01 t/year

$M^{Mp}_{CH} = 1{,}3$ x 0,13 x 0,74 x 0,10 x 1 = 0,0125 g/sec

$M^{год}_{CH} = 1{,}3$ x 0,13 x 0,74 x 0,10 x 600 x 3 x 60 x 10^{-6} = 0,001 t/year

$M^{mp}_{NO2} = 1{,}3$ x 0,13 X 0,74 x 0,10 x 1 = 0,0125 g/sec

$M^{год}_{NO2} = 1{,}3$ x 0,13 x 0,74 x 0,10 x 600 x 3 x 60 x 10^{-6} = 0,001 t/year

Calculation of the emission from vehicles (diesel engine):

Q = 0,08 l; p = 0,825; $A_{сп}$ = 2; T_P = 60;

M^{Mp}_{co} = 1,3 x0,08 x 0,825 x 0,1 x 1 = 0,0086 g/sec

$M^{год}_{CH}$ = 1,3 x 0,08 x 0,825 x 0,1 x 600 x 2 x 60 x 10^{-6} = 0,006 t/year

M^{Mp}_{CH} = 1,3 x 0,08 x 0,825 x 0,06 x 1 = 0,0051 g/sec

$M^{год}_{CH}$ = 1,3 x 0,08 x 0,825 x 0,06 x 600 x 2 x 60 x 10^{-6} = 0,0004 t/year

M^{mp}_{NO2} = 1,3 X 0,08 x 0,825 x 0,03 x 1 = 0,0026 g/sec

$M^{год}_{NO2}$ = 1,3 x 0,08 x 0,825 x 0,03 x 600 x 2 x 60 x 10^{-6} = 0,0002 t/year

УКРАЇНА, МИКОЛАЇВСЬКА ОБЛАСТЬ ВІТОВСЬКИЙ РАЙОН с.ШЕВЧЕНКОВЕ
ФЕРМЕРСЬКЕ ГОСПОДАРСТВО
«ОРГАНІК СІСТЕМС»
35521091

Calculation of pollutants from the safety valves of FD

Source009.

Collection of the air emission indicators (specific pollutants) from different types of manufacture. Volume I UkrNTEK, Donetsk-2004

Annual methane emission

Threshold volumes of industrial and technological losses of natural gas under conditional normative sealing of equipment and devices GRP, SHRP, DKRT (Table VIII-10)

Source	Equipment	Supply, m /day	
		Heating season	Non-heating season
004	Gas pressure regulation, demanding outside energy source natural gas) and placement to	15,4	15,4

$M^{год} = П * n * P * 10^{-3}$

Where П- supply of natural gas, m /day;
P- natural gas density, kg/m^3; P = 0,73 kg/m^3
n – heating period, d/year (60 d /year.)
$M^{год}$= 15,4 * 60 * 0,73* 10^{-3} = 0,675 t/year

Max. Single time methane boost:

$M^{год} = П * P : 24: 3600 * 10^3$, g/sec

$M^{год}$= 15,4 * 0,73 : 24: 3600 * 10^3 = 0,1301 g/sec

Calculation of pollutants emission

from road vehicles (tomatoes acceptance site, workshop for pre-production preparation)

Source 010.

- Road transport - 4 vehicles.

Main type of fuel - diesel.

Defining the pollutant emissions from motor vehicles was performed according to the "Method for calculating the emissions of harmful substances from vehicles combustion engines", RD 238 84001-106-89, UkrSSR Kyiv, 1989.

The maximum single time emission is determined following the formula:

$$M_i^{Mp} = 1.3 * Q * p * Пхх * A_{сп}, \text{ g/s}$$

Where ***Q*** - is the normative fuel consumption of specified car for 1 km, l/km;

P – diesel fuel density, kg / l;

$A_{сп}$ - number of cars of the calculated group;

$П_{хх}$ – coefficient, characterizing the ratio of the pollutant mass, released to the mass of fuel burned; see the table:

Fuel type	N0	Пхх CO	CH
Diesel fuel	0,03	0,1	0,06

The annual emission rate is calculated on the ground of formula:

$M_i^{Mp} = 1.3 * Q * p * Пхх * T * A_{сп} * 10^{-6}$, t/year

Where T — time of the vehicle's engine work, sec.

The calculation of maximum single time emission is made for one vehicle of the group subject to calculation, the annual emission – for all the vehicles of the group.

Calculation of the emission from diesel trucks:

$Q = 0,25$ l ; $p = 0,825$; $A_{сп} = 4$; $T_P = 60$;

$M^{Mp}_{CO} = 1,3 \times 0,25 \times 0,825 \times 0,1 \times 1 = 0,0268$ g/sec

$M^{год}_{CO} = 1,3 \times 0,25 \times 0,825 \times 0,1 \times 600 \times 4 \times 60 \times 10^{-6} = 0,003$ t/year

$M^{Mp}_{CH} = 1,3 \times 0,25 \times 0,825 \times 0,06 \times 1 = 0,0161$ g/sec

$M^{год}_{CH} = 1,3 \times 0,25 \times 0,825 \times 0,06 \times 600 \times 4 \times 60 \times 10^{-6} = 0,002$ t/year

$M^{mp}_{NO2} = 1,3 \times 0,25 \times 0,825 \times 0,03 \times 1 = 0,0080$ g/sec

$M^{год}_{NO2} = 1,3 \times 0,25 \times 0,825 \times 0,03 \times 600 \times 4 \times 60 \times 10^{-6} = 0,001$ t/year

Calculation of the emissions from BIOTAL treatment facilities

Source – ventilation system.
Capacuty - 20 m^3/day;
Ventilation pipe d = 0,2 m ; h = 3,0 м;
L = 100 m^3/hour = 0,03 m^3/sec

Threshold value for hydrogen sulfide - 0,008 mg/m^3 = 0,00001 g/m^3.
M = 0,00001 g/m^3 x 0,03 m^3/sec = 0,0000003 g/sec
$M_{год}$ = 0,0000003 x 8 x 365 x 3600 x 10^{-6} = 0,000003 t/year.

Threshold value for ammonia - 0,2 mg/m^3 = 0,0002 g/m^3.
M = 0,0002 g/m^3 x 0,03 m^3/sec = 0,00001 g/sec
$M_{год}$ = 0,00001 x **8** x 365 x 3600 x 10**'6** = 0,00006 t/year.

Threshold value for methane - 50,000 mg/m^3 = 0,05 g/m^3.
M = 0,05 g/m^3 x 0,03 m^3/sec = 0,0015 g/sec
Мгод = 0,0015 x 8 x 365 x 3600 x 10^{-6} = 0,016 t/year.

Calculation of emissions from the agricultural laboratory

(exhaust hood – ventilation system)

Сборник показателей эмиссии (удельных выбросов) загрязняющих веществ в атмосферный воздух разными производствами. Том I., Донецк-2004.
Threshold values for the emission of air poluttants from the general production laboratories

Nitrogen acid - 8,33 x 10^{-6} г/с

8,33 x 10**'6** x 60 x 1 x 3600 x 10**'6** = 0,0000002 t/year

Sodium hydroxide - 5,56 x 10^{-7} g/s

5,56 x 10^{-7} x 60 x 1 x 3600 x10**'6** = 0,0000001 t/year.

Calculation of the emission from chemical laboratory

Collection of emission indicators (specific emission) of pollutants into the atmosphere by different industries. Volume I., Donetsk-2004.

According to the method and data from the Table. X-97, sect. 1 (chemical laboratory) for specific emission of pollutants:

Nitrogen acid HNO_3- $M^{мр} = 0,0005$ g/s,

Sulfuric acid H_2SO_4- $M^{мр} = 0,0000267$ g/s,

Hydrogene chloride HCL - $M^{мр} = 0,000132$ g/s.

Work with acids is performed during T = 60 hour/year.

The mass of the annual emission makes:

$M^{год} = M^{мр} * T * 10^6$, t/year

Nitrogen acid - $M^{год} = 0,0005 \cdot 60 \cdot 3600 * 10^{-6} = 0,0001$ t/year

Sulfuric acid - $M^{мр} = 0,0000267 \cdot 60 \cdot 3600 - 10^{-6} = 0,000006$ t/year

Hydrogene chloride HCL-$M^{ш} = 0,000132 \cdot 60 \cdot 3600 \cdot 10^{-6} = 0,00003$ t/year

Calculation of the concentration of air pollutants from the laboratories and treatment facilities, according to p.2.3, 5.21 and 7.8 OND-86

Poll. Source	Pollutant	Emission rate (m), g/sec	TV mg/m³	M/TV	Emission source height (H) m	F = 0,1	Condition for calculation feasibility	Calculation feasibility
Laboratory	Natrium ydroxide	0,0000005	0,01	0,00005	3	0,1	0,00005<0,1	No
	Nitrogen acid	0,000008	0,4	0,00002	3	0,1	0,000020<0,1	--"--
Treatment facilities	Ammonium	0,00001	0,16	0,00006	3	0,1	0,000060 <0,1	No
	Hydriogene lfide	0,0000003	0,008	0,00005	3	0,1	0,000050<0,1	--"--
	Methane	0,0015	40	0,00003	3	0,1	0,000030<0,1	--"--
Chemical laboratory	Sulfuric acid	0,0000005	**0,01**	0,00005	7	0,1	0,000050<0,1	No
	Nitrogen acid	0,000008	0,4	0,00002	7	0,1	0,000020<0,1	--"--
	Hydrogene loride	0,000132	**0,2**	0,00066	7	0,1	0,000660 <0,1	--"--

The emission of harmful substances into the air from laboratories and treatment facilities are insignificant. The calculation of the pollutants dispersion by "EOL+" is not calculated as irrelevant.

Appendix 5

Calculation of contaminating emissions to atmosphere during construction

1. Calculation of emissions from wielding using E-42 electrodes

Source: Catalog of emission indexes of contaminating substances to atmosphere by industry, Volume I, UkrNTEK, Donetsk, 2004;

Partial emissions coefficients (Ai) of contaminating substances as follows (per kg of electrodes spent):

Iron oxide A_{Fe}=9.27 g/kg
Manganese and its compounds A_{Mn} =1.0 g/kg
Chromium oxide A_{CrO} =1.43 g/kg
Inorganic fluorides A_{XF} = 1.5 g/kg
Volatile fluorine compounds A_{HF} =0.001 g/kg

Total emission is calculated as

$$M_i - \frac{A_i \times P}{1000000}\ tones$$

Where P is total mass of electrodes spent during construction, estimated as 9500 kg.

$$M_{Fe} = \frac{7.48 \times 9500}{1000000} = 0.071\ tones$$

$$M_{Mn} = \frac{0.5 \times 9500}{1000000} = 0.005\ tones$$

$$M_{CrO} = \frac{0.02 \times 9500}{1000000} = 0.0002\ tones$$

$$M_{XF} = \frac{1.5 \times 9500}{1000000} = 0.014\ tones$$

$$M_{HF} = \frac{0.001 \times 9500}{1000000} = 0.000001\ tones$$

2. Calculation of emissions from wielding of polyethylene pipes

Source: Manual on calculation of atmospheric emissions from production and processing of polymer materials, Ministry of education of Russian Federation, Yekaterinburg, 2013;

Acetic acid A_{AA}=1,6 g/kg;
Carbon monoxide A_{CO}=1,0 g/kg;

Polyethelene dust
g/kg. A_D=0,4

Total emission is calculated as
$M_i = Ai \times P \times 10^{-6}$ *tones*
Where P is total mass of pipes installed during construction, estimated as 200 kg

$M_{AA}=1.6\times200\times10^{-6}=0.0003$ tones

$M_{CO}=1.0\times200\times10^{-6}=0.0002$ tones

$M_{D}=0.4\times200\times10^{-6}=0.0001$ tones

3. Calculation of emissions from painting works.

Source: Manual on the quantitative estimation of harmful emissions , Kyiv, 1990

Emissions are calculated as

$M = 0,00001\times S\times P$ tones

Where S - solvent content in the paint , %; P – total amount of paint

3.1 GF-021 primer. Total amount estimated as 2500 kg

Solvents content: White spirit – 2.7%, Xilene - 43.3%.

Total emissions:

$M_{Wite\ spirit}=0,00001\times2.7\times2500=0.067$ tones

$M_{Xilene}=0,00001\times43.3\times2500=1.08$ tones

3.2 PF-115 paint, total amount is 6200 kg

Solvents content: White spirit – 22.5%, Xilene – 22.5%

Total emissions:

$M_{Wite\ spirit}=0,00001\times22.5\times6200=1.39$ tones

$M_{Xilene}=0,00001\times22.5\times6200=1.39$ tones

4. Calculation of emissions from construction machines.

a)

Dozers (3 pcs), Engine displacement V=11.5 liters

Carbon monoxide:

$M=(160+13.5\times11.5)\times0.05\times120/6000 = 0.315$ kg/hour x 3 = 0.945 kg/hour

$M_{year}= 0.945\times180\times2\times10^{-3} = 0.34$ tones/year

Nitrogen dioxide:

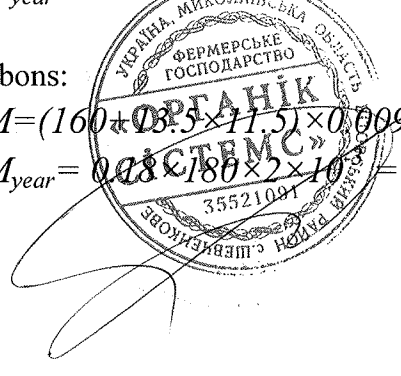
$M=(160+13.5\times11.5)\times0.035\times120/6000 = 0.22$ kg/hour x 3 = 0.66 kg/hour

$M_{year}= 0.66\times180\times2\times10^{-3} = 0.24$ tones/year

Hydrocarbons:

$M=(160+13.5\times11.5)\times0.009\times120/6000 = 0.06$ kg/hour x 3 = 0.18 kg/hour

$M_{year}= 0.18\times180\times2\times10^{-3} = 0.065$ tones/year



b) Diggers (3 pcs), Engine displacement V=11.5 liters

Carbon monoxide:

$M=(160+13.5\times11.5)\times0.05\times120/6000 = 0.315$ kg/hour x 3 = 0.945 kg/hour

$M_{year}= 0.945\times180\times2\times10^{-3} = 0.34$ tones/year

Nitrogen dioxide:

$M=(160+13.5\times11.5)\times0.035\times120/6000 = 0.22$ kg/hour x 3 = 0.66 kg/hour

$M_{year}= 0.66\times180\times2\times10^{-3} = 0.24$ tones/year

Hydrocarbons:

$M=(160+13.5\times11.5)\times0.009\times120/6000 = 0.06$ kg/hour x 3 = 0.18 kg/hour

$M_{year}= 0.18\times180\times2\times10^{-3} = 0.065$ tones/year

c) Tractors (3 pcs), Engine displacement V=11.5 liters

Carbon monoxide:

$M=(160+13.5\times11.5)\times0.05\times120/6000 = 0.315$ kg/hour x 3 = 0.945 kg/hour

$M_{year}= 0.945\times180\times2\times10^{-3} = 0.34$ tones/year

Nitrogen dioxide:

$M=(160+13.5\times11.5)\times0.035\times120/6000 = 0.22$ kg/hour x 3 = 0.66 kg/hour

$M_{year}= 0.66\times180\times2\times10^{-3} = 0.24$ tones/year

Hydrocarbons:

$M=(160+13.5\times11.5)\times0.009\times120/6000 = 0.06$ kg/hour x 3 = 0.18 kg/hour

$M_{year}= 0.18\times180\times2\times10^{-3} = 0.065$ tones/year

d) Carburetor trucks (2 pcs), Engine displacement V= 6 liters

$M=15$

$\times(0.6 + 0.8\times V)\times P\times120/6000$ kg/hour

$P=0.4$

$\times4 + 4$ for entrance

Carbon monoxide:

$$M=15\times(0.6+0.8\times6)\times(0.4\times4+4)\times120/6000 = 9.07 \text{ kg/hour x } 2 = 18.14 \text{ kg/hour}$$

$$M_{year}= 18.4\times360\times2\times10^{-3} = 13.1 \text{ tones/year}$$

e) Diesel trucks (3 pcs), Engine displacement V=10.85 liters

Carbon monoxide:

$$M=(160+13.5\times10.85)\times0.05\times120/6000 = 0.306 \text{ kg/hour x } 3 = 0.92 \text{ kg/hour}$$

$$M_{year}= 0.92\times360\times2\times10^{-3} = 0.66 \text{ tones/year}$$

Nitrogen dioxide:

$$M=(160+13.5\times10.85)\times0.035\times120/6000 = 0.214 \text{ kg/hour x } 3 = 0.63 \text{ kg/hour}$$

$$M_{year}= 0.63\times360\times2\times10^{-3} = 0.45 \text{ tones/year}$$

Hydrocarbons:

$$M_{year}= 0.18\times360\times2\times10^{-3} = 0.13 \text{ tones/year}$$

5. Calculation of emissions from groundworks

Source: Provisional manual on the calculation of emissions from irregular sources. Construction materials industry, NIPIOTstroy, Novorossiysk, 1982

Main source of dust emission is loading of ground on trucks by diggers.

Dust emission rate is calculated as

$$Q_2=(P_1\times P_2\times P_3\times P_4\times G\times10^6)/3600 \text{ g/sec}$$

Where P_1 is fraction of dust in the ground, to be measured by washing sifted ground sample to separate dust fraction with grains smaller than 200 microns

Estimation is $P_1 = 0.0015$

P_2 is fraction of particles becoming aerosol (grains smaller than 50 microns), relative to all dust in the material (presuming not all volatile dust transfers to the aerosol). Precise measurement of P_2 is by sampling dusty air on site, with 2 m/s wind blowing towards sampling location.

Estimation is $P_2 = 0.1$

P_3 is coefficient accounting for wind speed in the digging area, sourced from table 15

Estimation is $P_3=1.2$

P_4 is coefficient accounting for ground humidity, sourced from table 4

Estimation is P_4=0.8

G is amount of ground loaded per hour
Estimation is G=70 tones/hour

$$Q_2=(0.0015\times1.2\times0.8\times70\times10^6)/3600=2.8\ g/sec$$

$$.80\times5(days)\times6(hours)\times36000\times10^{-6}=0.3\ tones/year \qquad Q_{year}=2$$